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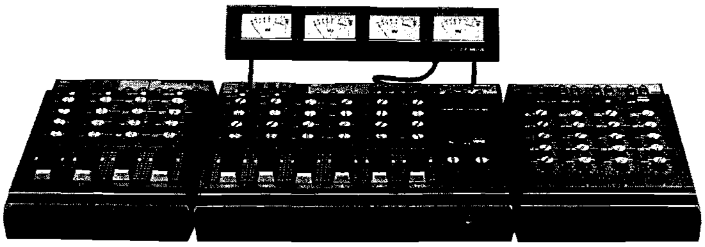
TEAC Production Products

TEAC -00381



SERVICE MANUAL

SYSTEM-20

AUDIO MIXER

Effective: May, 1981 Q10098

5704008700

381

TABLE OF CONTENTS

1. Specifications .... 3 – 4
2. Features and controls .... 5 – 9

3. Checking signal levels and functions

MM-20/EX-20

3-1. MIC (1) → DIRECT OUT (M1) line 10
3-2. LINE IN (1) → DIRECT OUT (L1) line 10
3-3. BUSS IN (1) → BUSS OUT (LINE 1) line 10
3-4. MIC (1) → BUSS OUT (LINE 1), (LINE 2) line 11
3-5. S/N at MIC (1) + (2) → BUSS OUT (LINE 1), (LINE 2) line 11
3-6. LINE (1) → BUSS OUT (LINE 3), (LINE 4) line 11
3-7. S/N at LINEs (1) + (2) + (3) + (4) → BUSS OUT (LINE 3), (LINE 4) line 12
3-8. MIC (1) → BUSS OUT (LINE A), (LINE B) line 12
3-9. LINE (1) → BUSS OUT (LINE A), (LINE B) line 12
3-10. S/N at LINEs (1) + (2) + (3) + (4) → BUSS OUT (LINE A), (LINE B) line 13
3-11. MASTER BUSS IN (LEFT/RIGHT) → OUTPUT LINE (LEFT/RIGHT) line 13
3-12. HEADPHONE IN (LEFT/RIGHT) → HEADPHONES line 13

PE-20

3-13. HIGH FREQ (10 kHz)/LEVEL 14
3-14. MID FREQ (1 kHz – 8 kHz)/ LEVEL 14
3-15. LOW FREQ (60 Hz – 1.5 kHz) LEVEL 14
3-16. Supply voltage at the DIN terminal 14
MU-20 14
4. Assembling hardware coding lists 15
5. Exploded views and parts lists ..... 16 – 25
6. PC boards and parts lists .... 26 – 37
7. Semiconductors lists 38
8. Level diagrams 39
Circuit diagrams .... Insert

NOTES: 1. Parts marked with * require longer delivery time than regular parts.
2. Parts marked with ⚠ are safety critical components. They must always be replaced with components specified by TEAC.
3. 0 dBV is referenced to 1 V.
4. In the diagram of each PC Board, its pattern surface is shown.
5. All resistors are 1/4 W, ±5 %, unless marked otherwise. Resistor values are in ohms (k = 1000 ohms).
6. Capacitor values are in microfarads (p = picofarads).
7. Service data are found where they are necessary.
8. Changes in specifications and features may be made without notice or obligation.

1. SPECIFICATIONS

MM-20

6-Input (2-Mic, 4-Line)/ 6-Buss Output/2-Line Output

Mic Input – channel 1 – 2:	
Source impedance:	200 ohms nominal mics (matched for mics of 600 ohms or less)
Input impedance:	1k ohms, balanced XLR type
Nominal input level:	-60 dBV (1 mV)
Minimum input level:	-70 dBV (0.3 mV) – TRIM at max. and ATT to 0 dB
Maximum input level:	-30 dBV (30 mV) – TRIM at min. and ATT to 20 dB
Line Input – channel 3 – 6:	
Input impedance:	50k ohms
Nominal input level:	-10 dBV (0.3 V)
Minimum input level:	-28 dBV (40 mV) – TRIM at max.
Maximum input level:	+25 dBV (18 V) – TRIM at min.
ACCESS SEND Output:	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Maximum output level:	0 dBV (1.0 V)
ACCESS Receive Input:	
Input impedance:	20k ohms
Nominal input level:	-10 dBV (0.3 V)
Minimum input level:	-18 dBV (0.13 V)
Direct Output:	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Buss Output (BUSS 1 – 4, A, B)	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Buss Input (BUSS 1 – 4, A, B)	
Input impedance:	20k ohms
Nominal input level:	-10 dBV (0.3 V)
Maximum input level:	+15 dBV (3.2 V)
Master Buss Input (MASTER BUSS L, R)	
Input impedance:	20k ohms
Nominal input level:	-10 dBV (0.3 V)
Minimum input level:	-18 dBV (0.13 V)
Line Output:	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Maximum output level:	+17 dBV (7 V)
Monitor Input:	
Input impedance:	20k ohms
Nominal input level:	-10 dBV (0.3 V)
Minimum input level:	-18 dBV (0.13 V)
Headphone Output:	
Load impedance:	8 ohms
Nominal output power:	100 mW
Maximum output power:	Greater than 500 mW – Output VR at max.
Frequency Response:	30 – 20,000 Hz, ±2 dB
Signal to Noise Ratio (A weighted/unweighted)	
Single Input:	
Mic input buss output:	Better than 65 dB/60 dB
Line input to buss output:	Better than 75 dB/70 dB
Master buss in to line out:	Better than 75 dB/70 dB
Monitor input to headphone out:	Better than 75 dB/70 dB
Plural Input:	
Mic/Line input to buss out:	Better than 60 dB/54 dB
Cross Talk:	Higher than 60 dB at 1 kHz
Total Harmonic Distortion:	Less than 0.1 % at 1 kHz, nominal input level
Fader Attenuation:	60 dB or more
TRIM Range:	±10 dB (Line/Mic)
DC Power Output for EX-20:	±12 V DC, Max. 170 mA (regulated)
DC Power Output for MU-20:	+8 to +10 V DC, Max. 290 mA (unregulated)
Dimensions:	95(H) x 380(W) x 356(D) mm (4.2″ x 16.9″ x 15.8″)
Weight:	4.2 kg (9.2 lbs.)
Power Requirement:	100/120/220/240 V AC, 50/60 Hz, 15 W (General Export Model) 120 V AC, 60 Hz, 15 W (U.S.A./Canada Model) 220 V AC, 50 Hz, 15 W (Europe Model) 240 V AC, 50 Hz, 15 W (UK/AUS Model)

MU-20

4-VU Meter with Peak Level Indicator

Input:	
Input impedance:	10k ohms
Nominal input level:	-10 dBV (0.3 V)
VU Meter	
Operation angle:	85 degree
Meter scale indication:	-20 to +5 VU
Peak indicator:	Red LED
Meter lamp:	8 V, 55 mA
Peak Indicator Level:	10 dB above 0 VU
Dimensions:	71(H) x 370(W) x 49(D) mm, (3.1″ x 16.4″ x 2.2″) 166 mm(H), 7.4″ – mounting bracket
Power Requirement:	8 to 10 V DC, supplied from MM-20

EX-20

4-Input (Mic x 4)/4-Buss Output

Mic Input:	
Source impedance:	200 ohms nominal mics (matched for mics of 600 ohms or less)
Input impedance:	1k ohms, balanced XLR type
Nominal input level:	-60 dBV (1 mV)
Minimum input level:	-70 dBV (0.3 mV) – TRIM at max. and ATT to 0 dB
Maximum input level:	-30 dBV (30 mV) – TRIM at min. and ATT to 20 dB
ACCESS SEND Output:	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Maximum output level:	0 dBV (1.0 V)
ACCESS Receive Input:	
Input impedance:	20k ohms
Nominal input level:	-10 dBV (0.3 V)
Minimum input level:	-18 dBV (0.13 V)
Direct Output:	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Buss Output:	
Minimum load impedance:	5k ohms
Nominal load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
Buss Input:	
Input impedance:	20k ohms
Nominal input level:	-10 dBV (0.3 V)
Maximum input level:	+15 dBV (3.2 V)
Frequency Response:	30 – 20,000 Hz, ±2 dB
Signal to Noise Ratio (A weighted/unweighted):	
Single input:	Better than 65 dB/60 dB
Multiple input:	Better than 65 dB/60 dB
Cross Talk:	Better than 60 dB at 1 kHz
Total Harmonic Distortion:	Less than 0.1 % at 1 kHz, nominal input level
Fader Attenuation:	60 dB or more
TRIM Range:	±10 dB
Dimensions:	95(H) x 216(W) x 356(D) mm (4.2″ x 9.6″ x 15.8″)
Weight:	2.0 kg (4.4 lbs.)
Power Requirement:	±12 V DC, 170 mA, supplied from MM-20

PE-20

4-Input/4-Output/4-Channel

Input:	
Input impedance:	100k ohms
Nominal input level:	-10 dBV (0.3 V)
Maximum input level:	+15 dBV (3.2 V)
Cue Output:	Connected to input terminals in parallel
Line Output:	
Minimum load impedance:	5k ohms
Load impedance:	10k ohms
Nominal output level:	-10 dBV (0.3 V)
AUX Output:	Connected to line output terminals in parallel
Equalizer:	
Frequency, low:	60 Hz – 1.5 kHz adjustable
, middle:	1 kHz – 8 kHz adjustable
, high:	10 kHz fixed
Level:	±12 dB adjustable
Signal to Noise Ratio:	Better than 80 dB
Cross Talk:	Better than 60 dB
Total Harmonic Distortion:	Less than 0.1 % (1 kHz, nominal input level)
DC Power Output for EX-20:	±12 V DC, Max. 170 mA (regulated)
Dimensions:	95(H) x 216(W) x 356(D) mm (4.2″ x 9.6″ x 15.8″)
Weight:	2.1 kg (4.62 lbs.)
Power Requirement:	100/120/220/240 V AC, 50/60 Hz, 4.2 W (General Export Model) 120 V AC, 60 Hz, 4.2 W (U.S.A./Canada Model) 220 V AC, 50 Hz, 4.2 W (Europe Model) 240 V AC, 50 Hz, 4.2 W (UK/AUS Model)

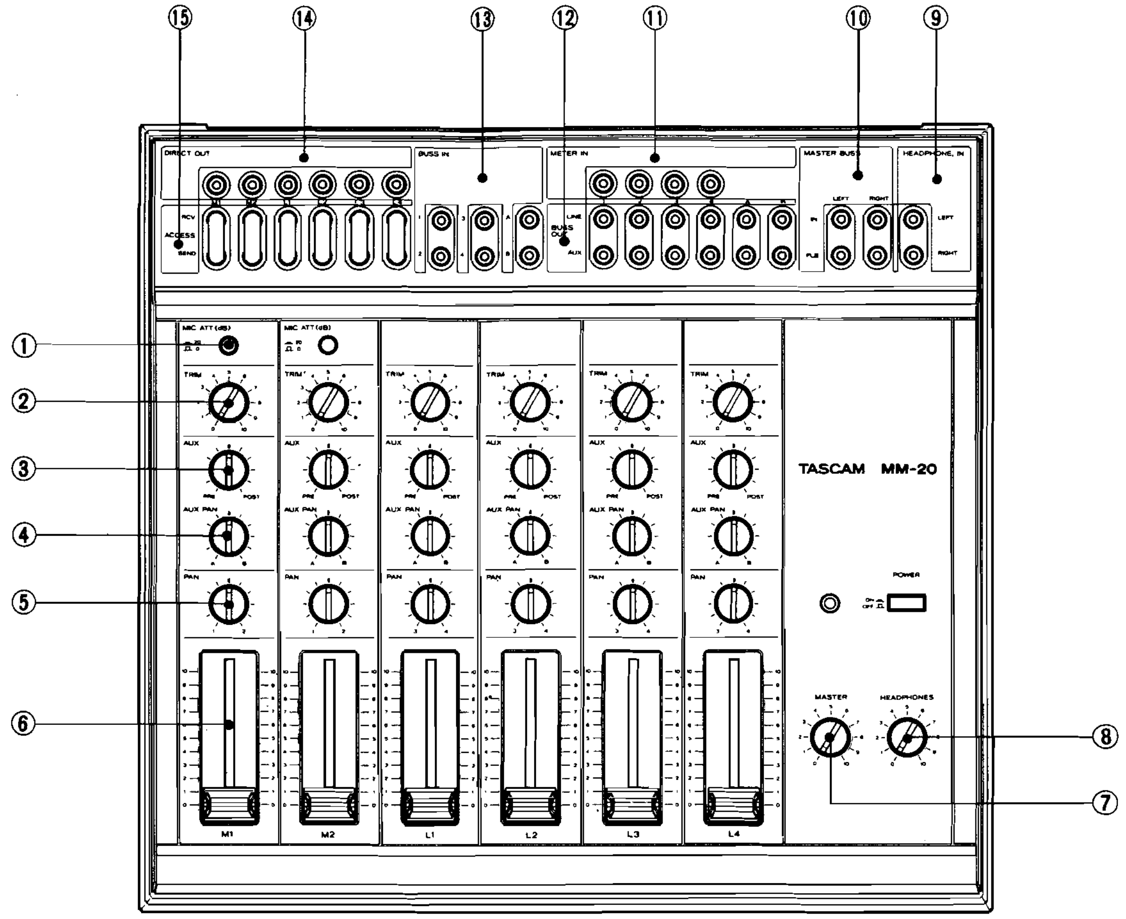
In these specifications, 0 dBV is referenced to 1.0 Volt.

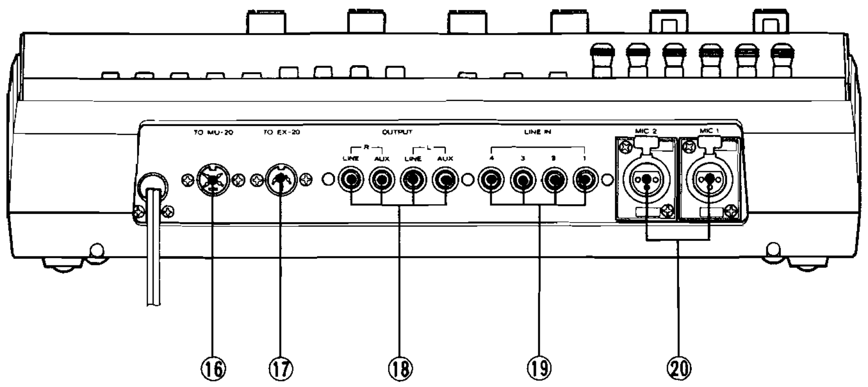
Actual voltage levels also are given in parenthesis. To calculate the 0 dB – 0.775 Volt reference level (i.e., 0 dBm in a 600-ohm circuit) add 2.2 dB to the listed dB value; i.e., -10 dB re: 1 V – -7.8 dB re: 0.775 V.

Changes in specifications and features may be made without notice obligation.

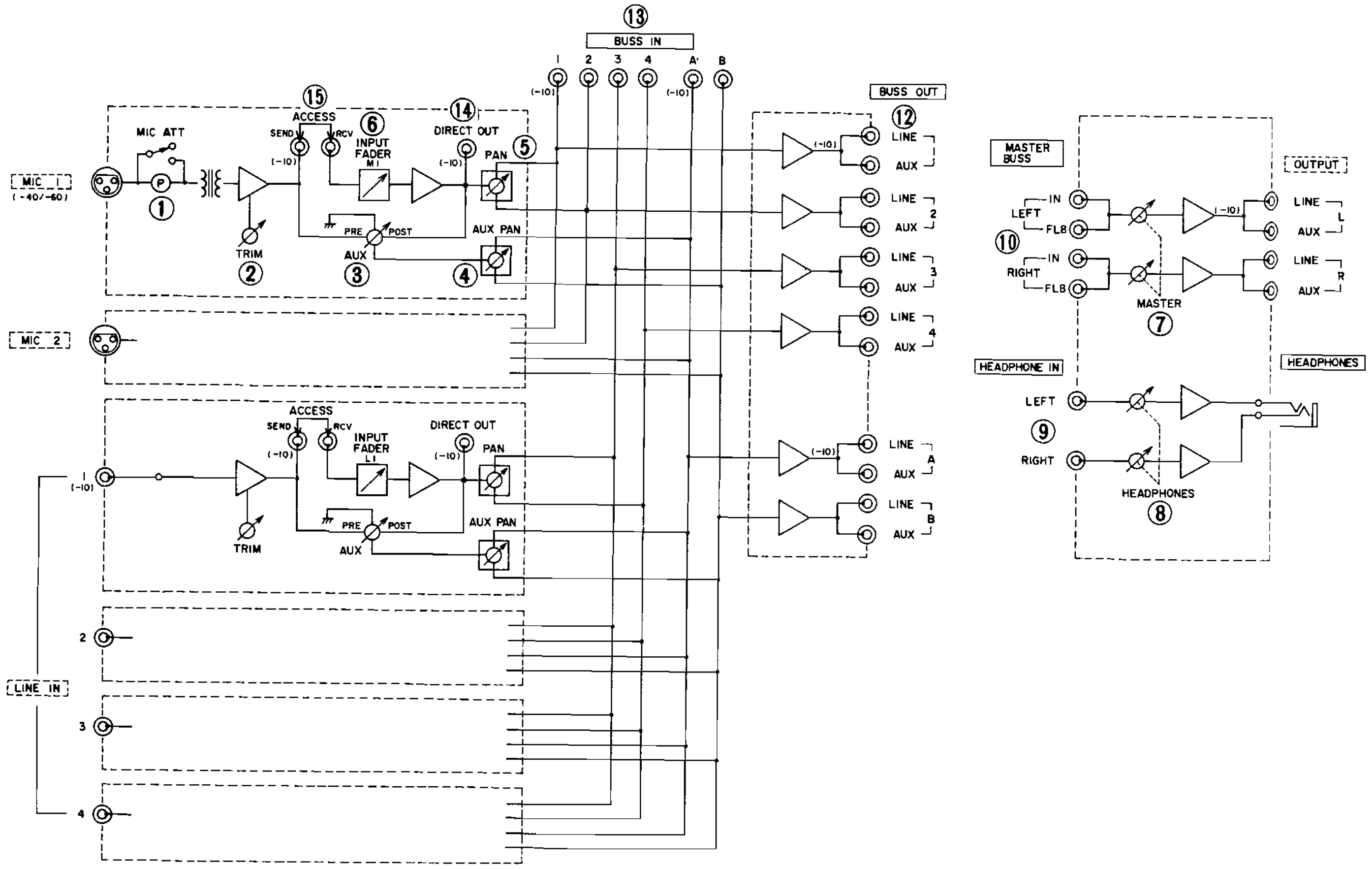
2. FEATURES AND CONTROLS

MM-20

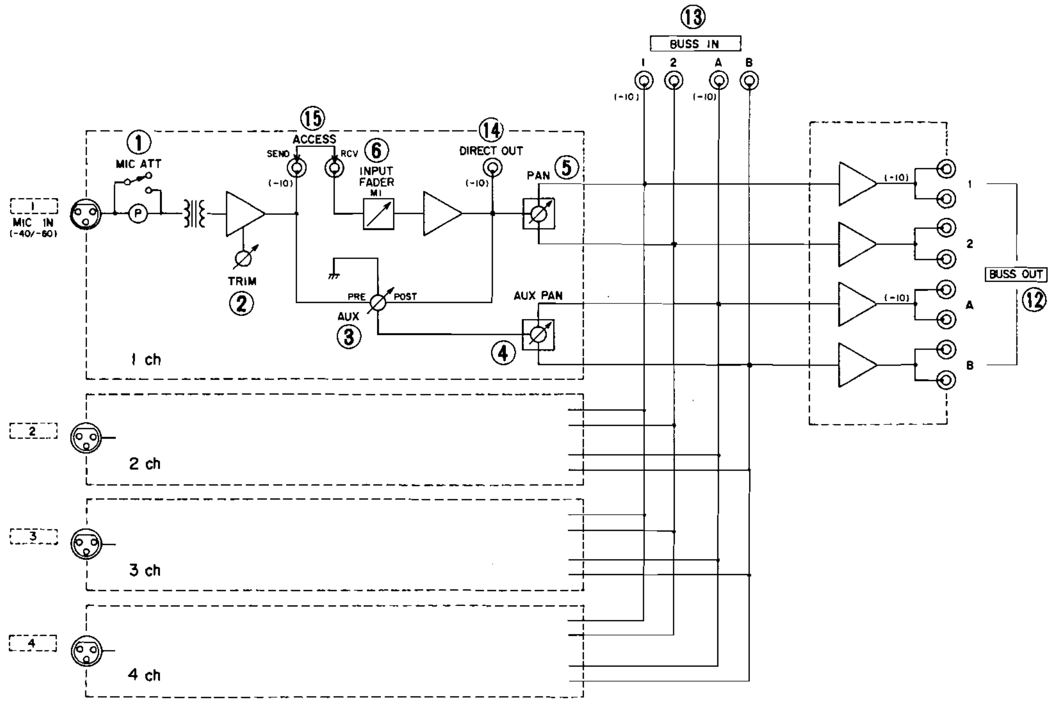

⑮
⑭
⑬
⑫
⑪
⑩
⑨
①
②
③
④
⑤
⑥
⑦
⑧
DIRECT OUT
BUSS IN
METER IN
MASTER BUSS
HEADPHONE IN
ACCESS
RCV
SEND
BUSS OUT
LINE
AUX
LEFT
RIGHT
MIC ATT (dB)
TRIM
AUX
PRE
POST
AUX PAN
PAN
TASCAM MM-20
POWER
MASTER
HEADPHONES
M1
M2
L1
L2
L3
L4


TO MU-20
TO EX-20
OUTPUT
LINE
AUX
LINE IN
MIC 2
MIC 1
⑯
⑰
⑱
⑲
⑳

BLOCK DIAGRAM OF MM-20


⑬
BUSS IN
1
2
3
4
A
B
(-10)
BUSS OUT
⑫
⑮
ACCESS
SEND
RCV
⑥
INPUT FADER
M1
⑭
DIRECT OUT
(-10)
PAN
⑤
MIC ATT
MIC 1
(-40/-60)
①
TRIM
②
PRE
POST
AUX
③
AUX PAN
④
MIC 2
LINE IN
INPUT FADER
L1
LINE
AUX
MASTER BUSS
LEFT
IN
FLB
⑩
RIGHT
MASTER
⑦
OUTPUT
L
R
HEADPHONE IN
⑨
HEADPHONES
⑧

BLOCK DIAGRAM OF EX-20


⑬
BUSS IN
1
2
A
B
(-10)
①
MIC ATT
MIC IN
(-40/-60)
⑮
ACCESS
SEND
RCV
⑥
INPUT FADER
M1
⑭
DIRECT OUT
PAN
⑤
TRIM
②
PRE
POST
AUX
③
AUX PAN
④
1 ch
2 ch
3 ch
4 ch
BUSS OUT
⑫

MM-20/EX-20

① Microphone input attenuator (MIC ATT)
When this is depressed, the built-in microphone attenuator attenuates the microphone input level by 20 dB.

② TRIM pot
This permits varying of the preamplifier gain in between 0 and 20 dB so that the input fader controls the microphone or line input to an optimum level (between marks 7 and 8).

③ Pre/Post-pot (AUX)
This controls the level of the microphone or line input signal which has or has not passed the input fader and is going to BUSS OUT. Set this control to the center position, and no signal will develop at either PRE or POST.

④ AUX PAN pot A & B
These divide the signal, which has or has not passed the input fader, to BUSS OUT A and B of the monitor circuit.

⑤ PAN pot
This causes the signal which has come in through MIC or LINE IN and passed the input fader to go out via BUSS OUT 1, 2, 3, and 4.
Select the center position, and the output level should be even at BUSS OUT 1 and 2 (or 3 and 4). Turn PAN 1 and 2 (or 3 and 4) counterclockwise, and the output level is lowered at BUSS OUT 2 (or 4). Turn them clockwise and the output level is lowered at BUSS OUT 1 (or 3).

⑥ Input fader
This controls the level of the microphone and line input signals. Select a position in the shaded area between marks (7) and (8), then S/N should be good and peak margin over 0 VU will be enough.

⑦ MASTER output level control
This permits simultaneously controling the levels (sound volumes) of (L) and (R) signals output through the rear-panel output terminals.

⑧ Headphone sound level control (HEADPHONES)
This controls the level (sound volume) of the signal on A + B BUSS or LINE when monitoring the signal.
Since this circuit is isolated, the monitoring signal goes through the front-panel headphones jack. Use headphones with 8 ohm impedance.

⑨ HEADPHONE IN
If a signal taken from any OUTPUT, DIRECT OUT, or ACCESS SEND or MIX BUSS signal is input to MONITOR IN L & R, the signal which has passed the monitor amplifier is output to STEREO HEADPHONES OUT. The input immedance is 20k ohms.

⑩ MASTER BUSS
The MASTER BUSS circuit is isolated from the signal path between MIC/LINE IN and BUSS OUT. Therefore, if a DIRECT OUT, ACCESS SEND, or BUSS OUT signal is jumpered to the MASTER BUSS IN terminal, the signal is output via the output terminal.
FLB: Use to deliver basic signal to another amplifier.

⑪ METER IN
Signal is set to the MU-20 via these terminals. These are isolated from the MM-20's circuits (BUSS OUT/OUTPUT). These serve as the input terminals of the meter amplifiers only when the MU-20 is connected.
Note: In the block diagram the METER IN terminals are omitted.

⑫ BUSS OUT (1 – 2, 3 – 4, A, B)
1 – 2 and 3 – 4 are ordinary output terminals. A and B are BUSS OUT of the monitor circuit.

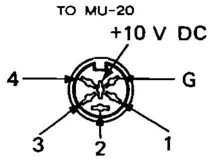
⑬ BUSS IN
1 – 2 and 3 – 4 are used to assign other signals. A and B are used for cueing. The input impedance is 20k ohms, the rated input level -10 dB (0.3 V), and the maximum input level +15 dB (5.6 V).

⑭ DIRECT OUT
Via these terminals, signals are output which are still to be assigned to modules and mixed. The output impedance is 100 ohms. The maximum output level free from clipping is +15 dB (5.6 V).

⑮ ACCESS SEND/RCV
Connect an auxiliary device such as an equalizer or echo effect amplifier to this terminal as necessary. Level is -10 dB (0.3 V) at the ACCESS SEND terminal. The output impedance is 10k ohms. The maximum input level free from clipping is 15 dB (5.6 V). The input impedance of ACCESS RCV is 15k ohms.
•**Note:** Install a shorting pin plug to this terminal when no auxiliary device is connected.

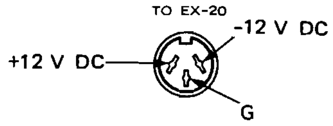
⑯ DIN socket TO MU-20

Via this 6-pin DIN socket, power is supplied to the MU-20 meter unit and the METER IN pin jacks are connected to the meters.



⑰ DIN socket TO EX-20

Power is supplied to the EX-20 expander via this 3-pin DIN socket.



⑱ OUTPUT terminals

The load impedance is 3k ohms or more, and the rated output level is -10 dBV.

⑲ LINE IN terminals

The input impedance is 50k ohms or more, and the rated input level is -10 dBV.

⑳ Microphone input connector (XLR cannon type)

This fits to a balanced type microphone with an impedance of 200 – 600 ohms.

㉑ Power connector

Since the EX-20 is not provided with its own power supply, connect it to the MM-20 or PE-20 when making operation checks.

MU-20

㉒ DIN plug

When this is plugged in to the TO MU-20 DIN socket of the MM-20, the meter unit is supplied with power and METER IN 1 – 4 on the patch bay of the MM-20 serves as the meter input terminal. You may apply any signal to this terminal and monitor on the meter. The LED peak indicator lights when the level is 10 dB or more high than 0 VU.

PE-20

㉓ HIGH FREQ (10 kHz)/LEVEL

Turn this control fully clockwise, and the signal level is boosted by 12 dB at 10 kHz (frequency is fixed). At the end of counterclockwise turn, the level is reduced by 12 dB.

㉔ MID FREQ (1 kHz – 8 kHz)/LEVEL

Turn the MID FREQ control fully counterclockwise, and a center frequency of 1 kHz is available. At the end of clockwise turn, a center frequency of 8 kHz is swept.
The LEVEL control boosts or reduces the level by 12 dB.

㉕ LOW FREQ (60 Hz – 1.5 kHz)/LEVEL

Turn the LOW FREQ control fully counterclockwise, and a center frequency of 60 Hz is available. At the end of clockwise turn, a center frequency of 1.5 kHz is obtained.
The LEVEL control boosts or reduces the level by 12 dB.

㉖ INPUT/CUE OUT

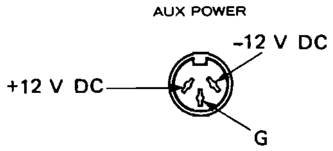
Input impedance is 100k ohms or more at INPUT. The CUE OUT terminals which are connected to INPUT in parallel are used to send input signals to other amplifiers or mixers.

㉗ LINE OUT/AUX OUT

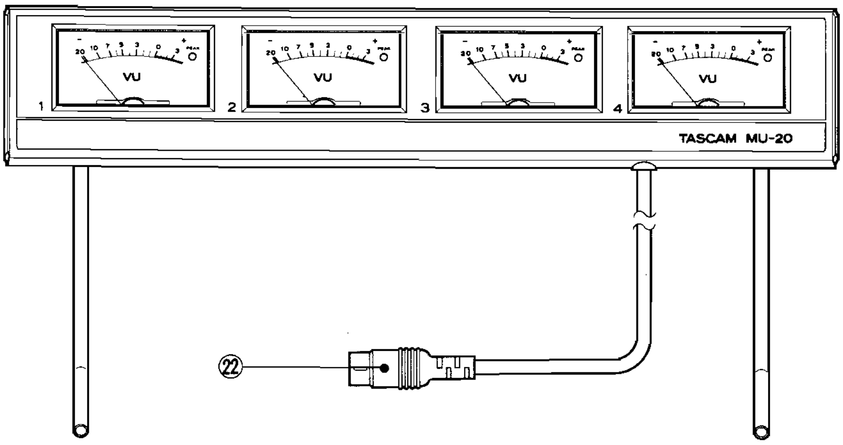
The AUX OUT terminals, connected to LINE OUT in parallel, are used as auxiliary terminals.

㉘ DIN socket (AUX POWER)

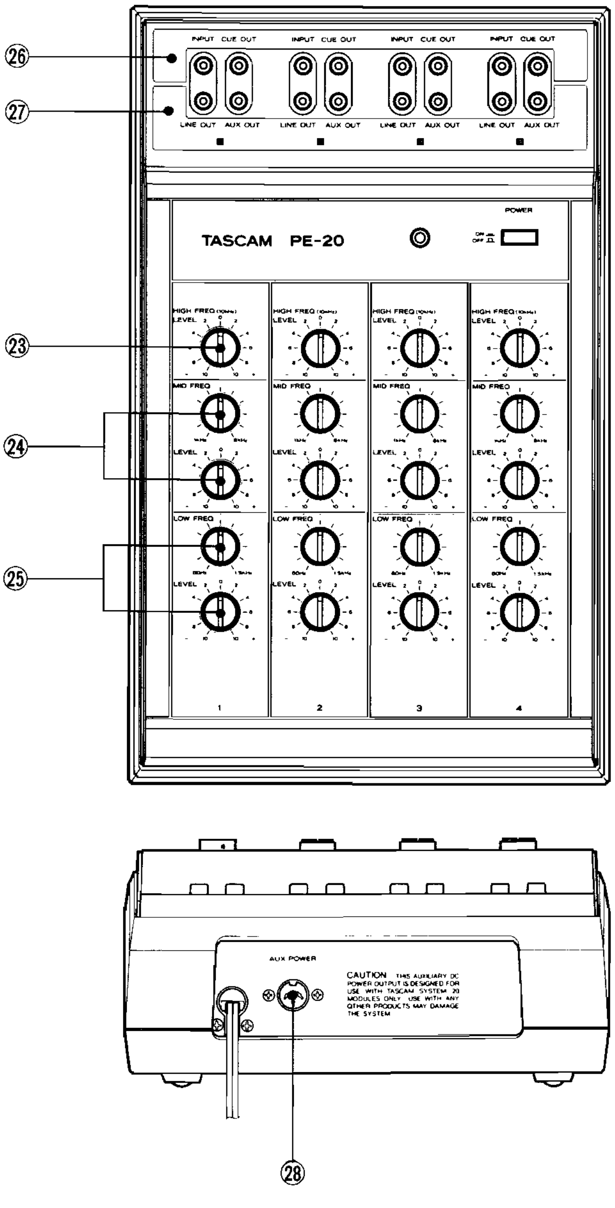
The EX-20 is supplied with power via this connector.



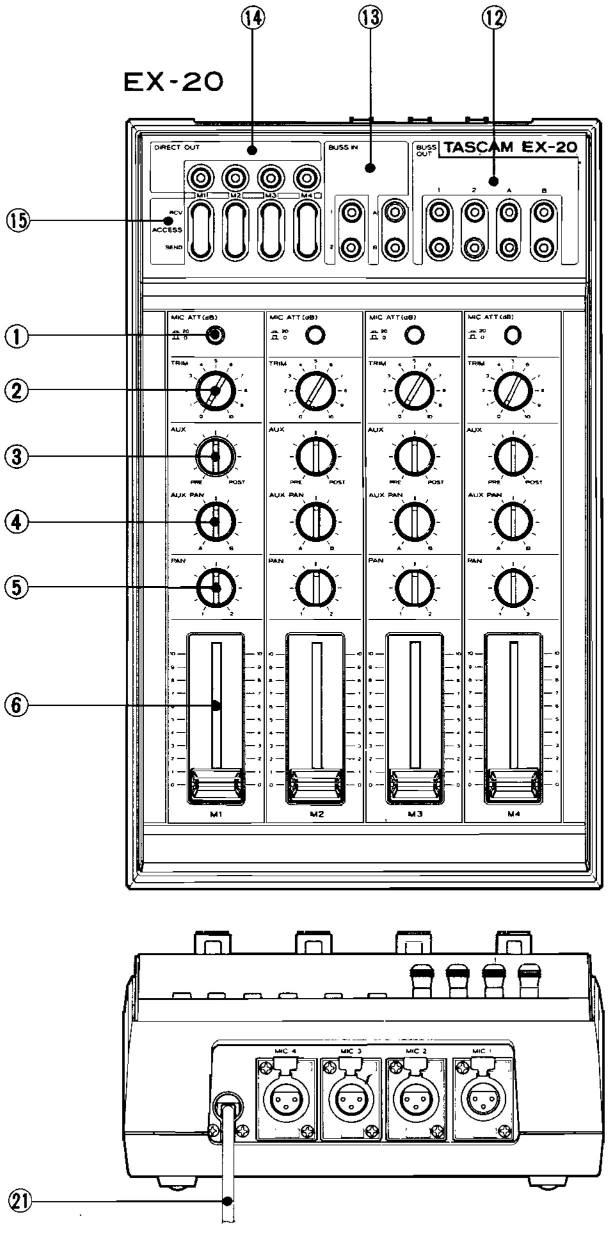
MU-20


1
2
3
4
VU
PEAK
TASCAM MU-20
㉒

PE-20


INPUT
CUE OUT
LINE OUT
AUX OUT
TASCAM PE-20
POWER
ON
OFF
HIGH FREQ (10kHz)
LEVEL
MID FREQ
LOW FREQ
1
2
3
4
AUX POWER
CAUTION THIS AUXILIARY DC POWER OUTPUT IS DESIGNED FOR USE WITH TASCAM SYSTEM 20 MODULES ONLY. USE WITH ANY OTHER PRODUCTS MAY DAMAGE THE SYSTEM
㉓
㉔
㉕
㉖
㉗
㉘

EX-20


DIRECT OUT
BUSS IN
BUSS OUT
TASCAM EX-20
M1
M2
M3
M4
RCV
ACCESS
SEND
1
2
A
B
MIC ATT (dB)
TRIM
AUX
PRE
POST
AUX PAN
PAN
MIC 4
MIC 3
MIC 2
MIC 1
①
②
③
④
⑤
⑥
⑫
⑬
⑭
⑮
㉑

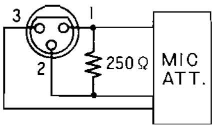
3. CHECKING SIGNAL LEVELS AND FUNCTIONS

MM-20/EX-20

Note: The following description applies mainly to the MM-20. To check the EX-20, refer mainly to the description on the MIC module of the MM-20.

3-1. MIC (1) → DIRECT OUT (M1) line

1) Apply a signal of -60 dBV/1 kHz to the MIC (1) terminal.
2) Connect a level meter to the DIRECT OUT (M1) terminal.
3) Set up the system as follows:
   MIC ATT of (M1): OFF
   (M1) fader control: between marks 7 and 8
4) Adjust the DIRECT OUT level to -10 dBV with the (M1) TRIM control. At this time, check that the control is set between marks 4 and 6.
5) Turn on (M1) MIC ATT and set to the conditions of step (4). Check that the output level at DIRECT OUT (M1) falls by 20 dB ± 2 dB.
6) Check frequency response in the setting of step (4). The output level should be -10 dBV ± 2 dB over the input frequency range of 20 Hz to 20 kHz.
   Note:
   When checking frequency response, connect a 250-ohm resistor across the input terminals.


3
1
2
250Ω
MIC ATT.

7) Receiving a zero signal in the setting of step (4), read the difference between the rated level (-10 dBV) and noise. It should be 57 dB or more.

Check the MIC (2) → DIRECT OUT (M2) line in the same way.

3-2. LINE IN (1) → DIRECT OUT (L1) line

1) Apply a -10 dBV/1 kHz signal to the LINE IN (1) terminal.
2) Connect a level meter to the DIRECT OUT (L1) terminal.
3) Set the (L1) fader control between marks 7 and 8.
4) Adjust the level at DIRECT OUT to -10 dBV with the (L1) TRIM control. At this time, check that the control is set between marks 4 and 6.
5) Check frequency response with setting of step (4). The output level should be -10 dBV ± 2 dB over 20 Hz to 20 kHz in input frequency.
6) Receiving zero signal in the setting of step (4), read the difference between the rated level (-10 dBV) and noise. It should be 70 dB or more.

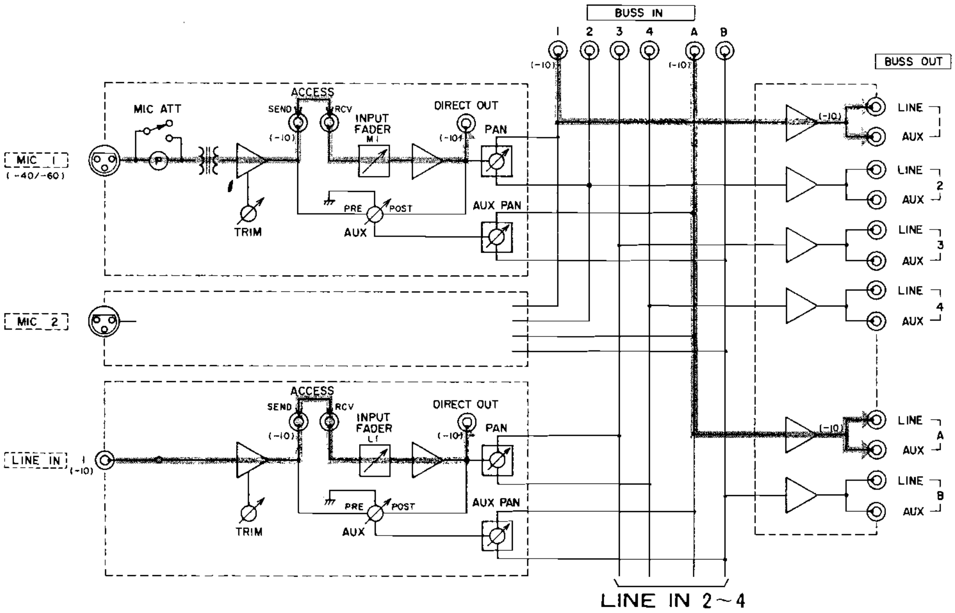
Check the LINE (2) → DIRECT OUT (L2) line and each module of (3) and (4) in the same way.

3-3. BUSS IN (1) → BUSS OUT (LINE 1) line

1) Apply a -10 dBV/1 kHz signal to the BUSS IN (1) terminal.
2) Connect a level meter to the BUSS OUT (LINE 1) terminal.
3) Check that the output level is -10 dBV ± 1 dB.

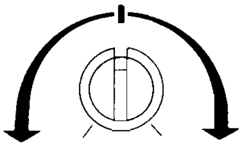
Check the BUSS IN (2) → BUSS OUT (LINE 2) line and line (3), (4), (A), and (B) in the same way.

The level at each AUX terminal is equal to that at the associated LINE terminal since the terminals are directly connected.


BUSS IN
1
2
3
4
A
B
(-10)
(-10)
BUSS OUT
MIC 1
(-40/-60)
MIC ATT
ACCESS
SEND
RCV
(-10)
INPUT FADER
M1
DIRECT OUT
(-10)
PAN
PRE
POST
AUX
AUX PAN
TRIM
MIC 2
LINE IN 1
(-10)
ACCESS
SEND
RCV
(-10)
INPUT FADER
L1
DIRECT OUT
(-10)
PAN
PRE
POST
AUX
AUX PAN
TRIM
(-10)
LINE
AUX
1
LINE
AUX
2
LINE
AUX
3
LINE
AUX
4
(-10)
LINE
AUX
A
LINE
AUX
B
LINE IN 2~4

3-4. MIC (1) → BUSS OUT (LINE 1), (LINE 2) line

1) Apply a -60 dBV/1 kHz signal to the MIC (1) terminal.
   Connect a 250-ohm resistor across the input terminals as in step 3-1.
2) Connect a level meter across the BUSS OUT (LINE 1) and (LINE 2) terminals.
3) Set up the system as follows:
   (M1) MIC ATT: OFF
   (M1) fader control: between marks 7 and 8
   (M1) PAN control: middle
4) Adjust the (M1) TRIM control so that the output level at BUSS OUT (LINE 1) and (LINE 2) is -12 dBV. At this time, the TRIM control should be set between marks 4 and 6.
5) Set the PAN control to mark 1 (minimum) and the level at BUSS OUT (LINE 2) should be -10 dBV ± 1 dB.
   At this time, the level at BUSS OUT (LINE 2) should be below -50 dBV.


Set to 1 or 3.
Set to 2 or 4.

6) Set the PAN control to mark 2 (maximum) and the level at BUSS OUT (LINE 2) should be -10 dBV ±1 dB.
   At this time, the level at BUSS OUT (LINE 1) should be below -50 dBV.
7) Cut off input signal from the step (5) setting and measure the signal-to-noise ratio at the BUSS OUT (LINE 1) terminal. The S/N will be greater than 56 dB. Check the S/N at the BUSS OUT (LINE 2) terminal in the same way.

Check the MIC (2) → BUSS OUT (LINE 1) (LINE 2) line in the same way.

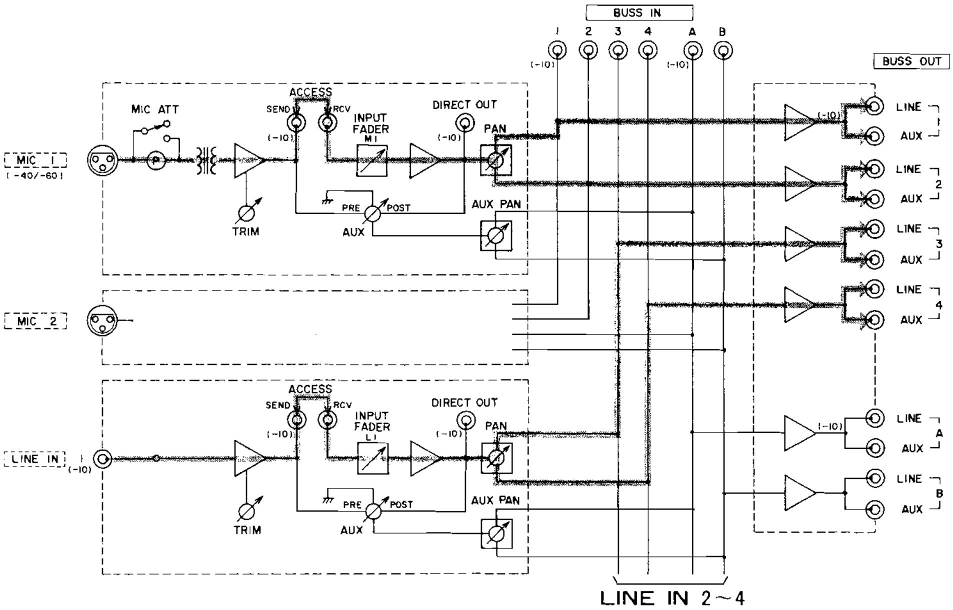
3-5. S/N at MIC (1) + (2) → BUSS OUT (LINE 1), (LINE 2) line

Check overall S/N of the total signal of MIC (1) and (2) by the following procedure.

1) After checking MIC (1) and (2) with procedures 3-4, set the PAN controls of MIC (1) and (2) to mark 1 without changing other setting. Cut off the input signal, and measure S/N at the BUSS OUT (LINE 1) terminal. S/N should be 54 dB or more.
2) Set MIC (1) and (2) PAN controls to mark 2, and measure S/N at the BUSS OUT (LINE 2) terminal. S/N should be 54 dB or more.

3-6. LINE (1) → BUSS OUT (LINE 3), (LINE 4) line

1) Apply a -10 dBV/1 kHz signal to LINE (1) terminal.
2) Connect a level meter across the BUSS OUT (LINE 3) and (LINE 4) terminals.
3) Set up the system as follows:
   (L1) fader control: between marks 7 and 8
   (L1) PAN control: middle
4) Adjust the (L1) TRIM control so that the output level at BUSS OUT (LINE 3) and (LINE 4) is -12 dBV. At this time, the TRIM control should be between marks 4 and 6.
5) Set the PAN control to mark 3 (minimum) and the level at BUSS OUT (LINE 3) should be -10 dBV ± 1 dB.
   At this time, the level at BUSS OUT (LINE 4) should be below -50 dBV.


BUSS IN
1
2
3
4
A
B
(-10)
(-10)
BUSS OUT
ACCESS
MIC ATT
SEND
RCV
INPUT FADER
M1
DIRECT OUT
(-10)
(-10)
PAN
MIC 1
(-40/-60)
PRE
POST
AUX PAN
TRIM
AUX
MIC 2
ACCESS
SEND
RCV
INPUT FADER
L1
DIRECT OUT
(-10)
(-10)
PAN
LINE IN 1
(-10)
PRE
POST
AUX PAN
TRIM
AUX
(-10)
LINE 1
AUX
LINE 2
AUX
LINE 3
AUX
LINE 4
AUX
(-10)
LINE A
AUX
LINE B
AUX
LINE IN 2~4

6) Set the PAN control to mark 4 (maximum) and the level at BUSS OUT (LINE 4) should be -10 dBV ± 1 dB.
At this time, the level at BUSS OUT (LINE 3) should be below -50 dBV.
7) Cut off the input signal from the step (5) setting and measure the S/N ratio at the BUSS OUT (LINE 3) terminal. The S/N should be greater than 70 dB. Check the S/N at the BUSS OUT (LINE 4) terminal in the same way.

Check the LINE (2) → BUSS OUT (LINE 3) (LINE 4) line and (LINE 3) and (LINE 4) in the same way.

3-7. S/N at LINEs (1) + (2) + (3) + (4) → BUSS OUT (LINE 3), (LINE 4) line

Check overall S/N of the total signal of LINEs (1), (2), (3), and (4) by the following procedure.

1) After checking LINE (1), (2), (3), and (4) with procedures 3-6, set the PAN controls of (L1), (L2), (L3), and (L4) to mark 3 without changing other settings. Cut off the input signal and measure the S/N at the BUSS OUT (LINE 3) terminal. The S/N should be 65 dB or more.
2) Set the PAN controls of (L1), (L2), (L3), and (L4) to mark 4, and measure the S/N at the BUSS OUT (LINE 4) terminal. The S/N should be 65 dB or more.

3-8. MIC (1) → BUSS OUT (LINE A), (LINE B) line

Follow the steps up to (4) in 3-1 to set up the check conditions.

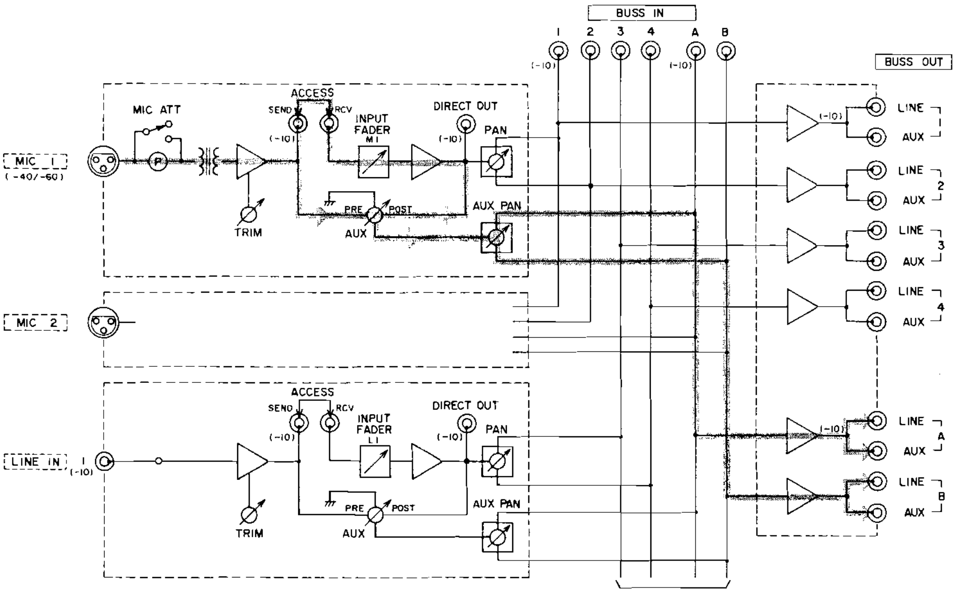
1) Connect a level meter to the BUSS OUT (LINE A) and (LINE B) terminals. Set the AUX control of (M1) to PRE and AUX PAN to the middle. Check that the output levels at both terminals are -12 dBV ± 1dB.
2) Set the (M1) AUX control to POST. Check that the output levels at both terminals are the same as in step (1).
3) Set the (M1) AUX PAN control to mark A (minimum) and the level at BUSS OUT (LINE A) should be -10 dBV ± 1 dB. At this time, the level at BUSS OUT (LINE B) should be below -50 dB.
4) Set the (M1) AUX PAN control to mark B (maximum) and the level at BUSS OUT (LINE B) should be -10 dBV ± 1 dB. At this time, the level at BUSS OUT (LINE A) should be below -50 dB.
5) Cut off the input signal from the setting of step (3) and measure the S/N at the BUSS OUT (LINE A) terminal. The S/N should be greater than 56 dB. Check the S/N at the BUSS OUT (LINE B) terminal in the same way.

Check the MIC (2) → BUSS OUT (LINE A) (LINE B) line in the same way.

3-9. LINE (1) → BUSS OUT (LINE A), (LINE B) line

Follow the steps up to (4) in 3-2 to set up the check conditions.

1) Connect a level meter to the BUSS OUT (LINE A) and (LINE B) terminals. Set (L1) AUX control to PRE and AUX PAN to the middle. Check that the output levels at both terminals are -12 dBV ± 1 dB.
2) Set (L1) AUX control to POST. Check that the output levels at both terminals are the same as step (1).


BUSS IN
1
2
3
4
A
B
(-10)
(-10)
BUSS OUT
MIC ATT
ACCESS
SEND
RCV
(-10)
INPUT FADER M1
DIRECT OUT
(-10)
PAN
MIC 1
(-40/-60)
TRIM
PRE
POST
AUX
AUX PAN
MIC 2
ACCESS
SEND
RCV
(-10)
INPUT FADER L1
DIRECT OUT
(-10)
PAN
LINE IN 1
(-10)
TRIM
PRE
POST
AUX
AUX PAN
LINE
AUX
1
LINE
AUX
2
LINE
AUX
3
LINE
AUX
4
LINE
AUX
A
LINE
AUX
B
(-10)
(-10)
LINE IN 2~4

3) Set (L1) AUX PAN control to mark A (minimum) and the level at BUSS OUT (LINE A) should be -10 dBV ± 1 dB. At this time, the level at BUSS OUT (LINE B) should be below -50 dB.
4) Set the AUX PAN control to mark B (maximum) and the level at BUSS OUT (LINE B) should be -10 dBV ± 1 dB. At this time, the level at BUSS OUT (LINE A) should be below -50 dB.
5) Cut off the input signal from the setting of step (3) and measure the S/N at the BUSS OUT (LINE A) terminal. The S/N should be greater than 70 dB. Check the S/N at the BUSS OUT (LINE B) terminal in the same way.

Check the LINE (2) → BUSS OUT (LINE A) (LINE B) line and LINE (3) and (4) in the same way.

3-10. S/N at LINEs (1) + (2) + (3) + (4) → BUSS OUT (LINE A), (LINE B) line

Check overall S/N of the total signal of LINE (1), (2), (3), and (4) by the following procedure.

1) After checking LINE (1), (2), (3), and (4) by the procedures in 3-9, set the PAN control of (L1), (L2), (L3), and (L4) to mark A without changing other conditions. Cut off the input signal and measure the S/N at the BUSS OUT (LINE A) terminal. The S/N should be 65 dB or more.
2) Set the PAN controls of (L1), (L2), (L3), and (L4) to mark B, and measure the S/N at the BUSS OUT (LINE B) terminal. The S/N should be 65 dB or more.

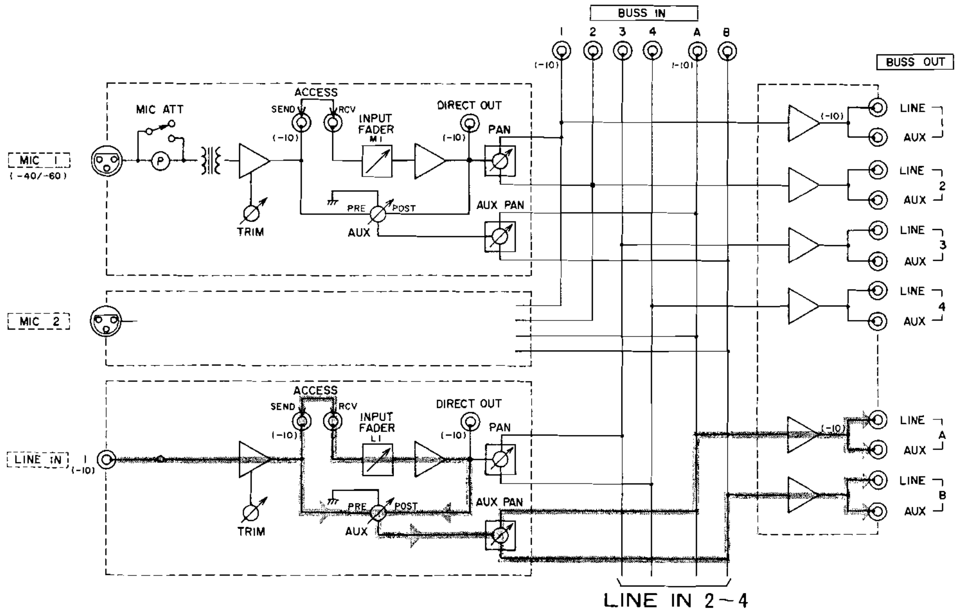
3-11. MASTER BUSS IN (LEFT/RIGHT) → OUTPUT LINE (LEFT/RIGHT) line

1) Apply a -10 dBV/1 kHz signal to the left and right channels of MASTER BUSS IN.
2) Connect level meters to the left and right channels of the OUTPUT LINE.
3) Adjust the MASTER control so that the level meters read -10 dBV. At this time, the MASTER control is positioned in between marks 7 and 8 and the level difference of the left and right channels should be within 2 dB.
4) Cut off the input signal and measure the S/N at OUTPUT LINE. The S/N should be 70 dB or more at both channels.

Each FLB terminal is connected directly to the associated IN terminal.

3-12. HEADPHONE IN (LEFT/RIGHT) → HEADPHONES line

1) Apply a -10 dBV/1 kHz signal to the left and right channels of HEADPHONE IN.
2) Connect a level meter and an 8-ohm load resistor to the HEADPHONES terminal.
3) When the HEADPHONES control is set to maximum, the output level at HEADPHONES should be 6 dBV (500 mW) or more.
4) Cut off the input signal without changing other conditions. The noise level should be below 0.3 mV.


BUSS IN
1
2
3
4
A
B
(-10)
(-10)
BUSS OUT
ACCESS
MIC ATT
SEND
RCV
(-10)
INPUT FADER
M1
DIRECT OUT
(-10)
PAN
MIC 1
(-40/-60)
P
TRIM
PRE
POST
AUX
AUX PAN
MIC 2
ACCESS
SEND
RCV
(-10)
INPUT FADER
L1
DIRECT OUT
(-10)
PAN
LINE IN 1
(-10)
TRIM
PRE
POST
AUX
AUX PAN
(-10)
LINE
AUX
1
LINE
AUX
2
LINE
AUX
3
LINE
AUX
4
(-10)
LINE
AUX
A
LINE
AUX
B
LINE IN 2~4

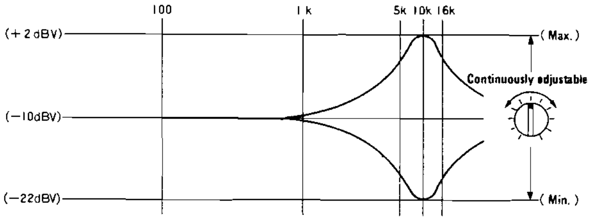
PE-20

Set all controls to their middle positions before checking the characteristics of the PE-20. Connect an oscillator to the INPUT terminal and a level meter to the LINE OUT terminal.

Note: After completion of each check item, be sure to return controls, if moved, to the middle position.

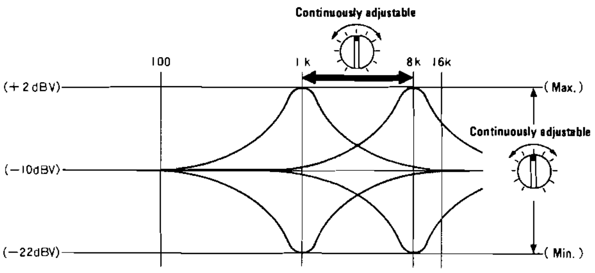
3-13. HIGH FREQ (10 kHz)/LEVEL

1) Apply a -10 dBV/10 kHz signal to the INPUT terminal.
2) Turning the HIGH FREQ control from minimum (mark -10) to maximum (mark 10), check that the output level of LINE varies by -10 dBV ± 12 dB or more.



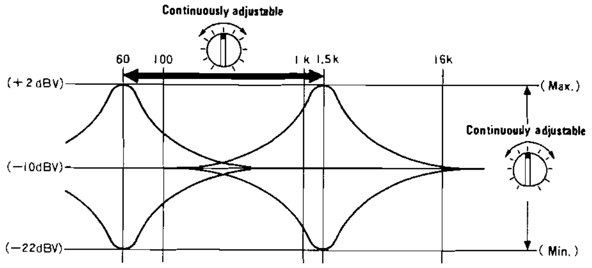
3-14. MID FREQ (1 kHz ~ 8 kHz)/LEVEL

1) Apply a -10 dBV/1 kHz signal to the INPUT terminal.
2) Set the MID FREQ control to 1 kHz. Turning the LEVEL control from minimum (mark -10) to maximum (mark 10), check that the output level of LINE varies by -10 dBV ± 12 dB.
3) Apply an 8 kHz signal to the INPUT terminal.
4) Set the MID FREQ control to 8 kHz. Turning the LEVEL control from minimum (mark -10) to maximum (mark 10), check that the output level of LINE varies by -10 dBV ± 12 dB.



3-15. LOW FREQ (60 Hz ~ 1.5 kHz)/LEVEL

1) Apply a -10 dBV/60 Hz signal to the INPUT terminal.
2) Set the LOW FREQ control to 60 Hz. Turning the LEVEL control from minimum (mark -10) to maximum (mark 10), check that the output level of LINE varies by -10 dBV ± 12 dB.
3) Apply a 1.5 kHz signal to the INPUT terminal.
4) Set the LOW FREQ control to 1.5 kHz. Turning the LEVEL control from minimum (mark -10) to maximum (mark 10), check that the output level of LINE varies by -10 dBV ± 12 dB.



3-16. Supply voltage at the DIN terminal

Supply voltage is -12 V DC across pin 1 and 2 of the rear panel DIN terminal and +12 V DC across pins 2 and 3.

MU-20

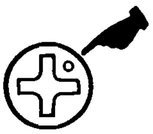
To check the equipment, connect the DIN connector to the MM-20 and apply the input signal through the pin terminal of the MM-20.

In the input circuit of the MU-20, channel 1 is connected to pin 2 of the DIN connector, channel 2 to pin 3, channel 3 to pin 4, and channel 4 to pin 5. Pin 1 of the DIN connector is the GND terminal common to all channels.

1) Apply a -10 dBV/1 kHz signal to all channels. Check that the VU meters read 0 VU.
   If not, adjust the semi-fixed resistors (channel 1: R102, channel 2: R202, channel 3: R302, channel 4: R402) on the MU-20 PCB assembly.
2) Raise the level of the input signal by 10 dB (to 0 dBV) in the setting of step (1). Check that the peak LEDs of the VU meters light.
   If the LEDs do not light, adjust semi-fixed resistors (channel 1: R111, channel 2: R211, channel 3: R311, channel 4: R411) in the PCB assembly so that they light.
3) After step (2), lower the input level by 1 dB (to -1 dBV). Check that the LEDs go out. If they do not go out, adjust the semi-fixed resistors used in step (2) so that they go out.

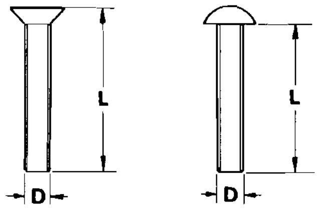
4. ASSEMBLING HARDWARE CODING LISTS

All screws conform to ISO standards, and have crossrecessed heads, unless otherwise noted.
ISO screws have the head inscribed with a point as in the figure to the right.

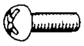
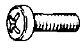
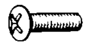
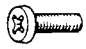
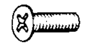
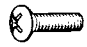
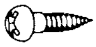
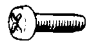
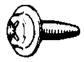
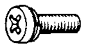
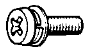
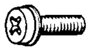
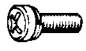
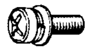


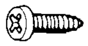
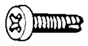
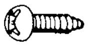
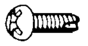
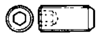
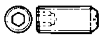
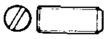
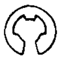
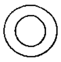
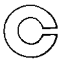
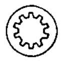
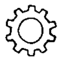
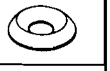
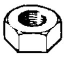
FOR EXAMPLE:

B M 3 x 6
Length in mm (L)
Diameter in mm (D) *
Metric System
Nomenclature



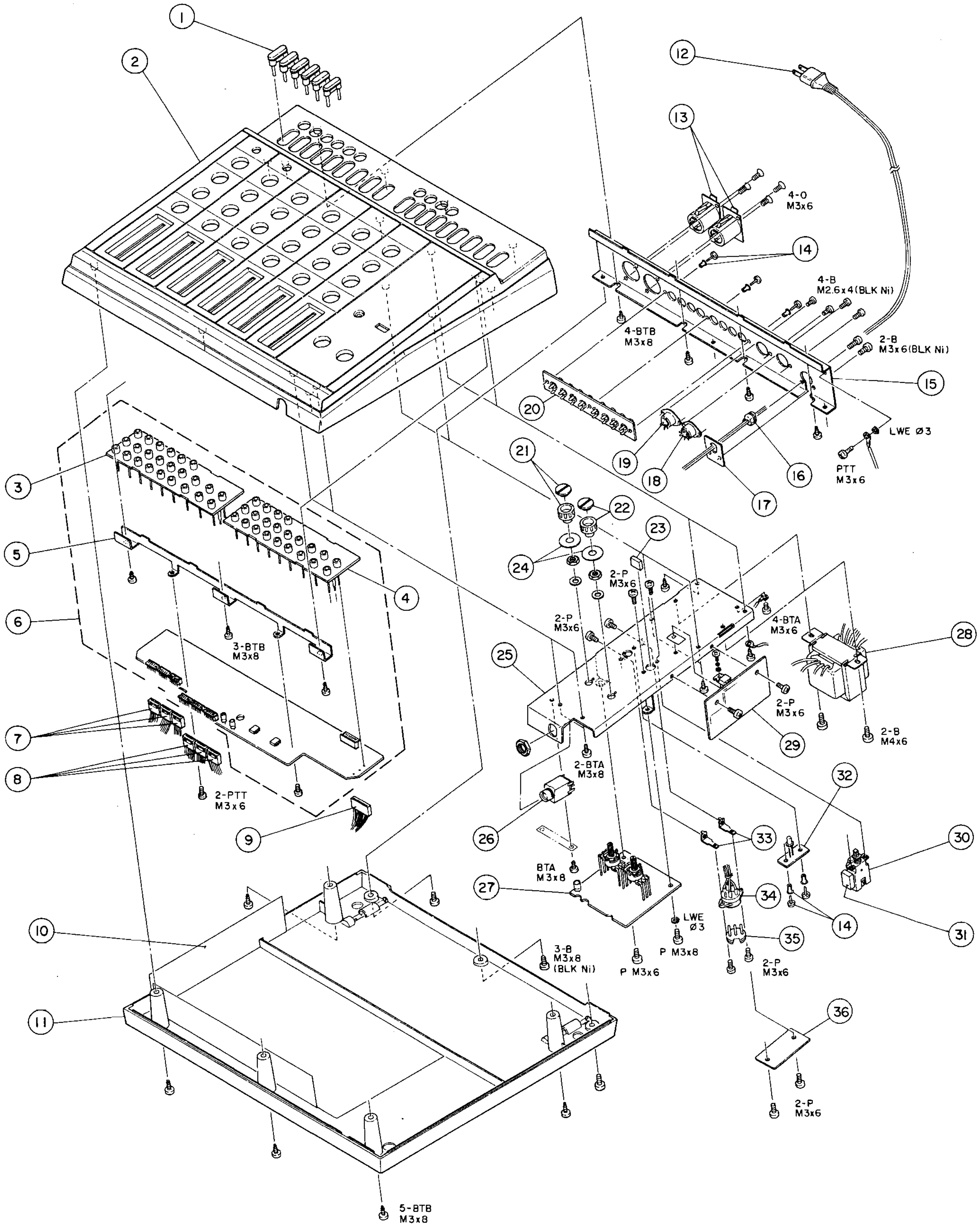
* Inner dia. for washers and nuts

	Code	*Name*	*Type*
MACHINE SCREW	**R**	Round Head Screw	
	P	Pan Head Screw	
	T	Stove Head Screw (Truss)	
	B	Binding Head Screw	
	F	Flat Countersunk Head Screw	
	O	Oval Countersunk Head Screw	
WOOD SCREW	**RW**	Round Head Wood Screw	
TAPTITE SCREW	**PTT**	Pan Head Taptite Screw	
	WTT	Washer Head Taptite Screw	
SEMS SCREW	**BSA**	Binding Head SEMS Screw(A Type)	
	BSB	Binding Head SEMS Screw(B Type)	
	BSF	Binding Head SEMS Screw(F Type)	
	PSA	Pan Head SEMS Screw(A Type)	
	PSB	Pan Head SEMS Screw(B Type)	

	Code	*Name*	*Type*
TAPPING SCREW	**BTA**	Binding Head Tapping Screw(A Type)	
	BTB	Binding Head Tapping Screw(B Type)	
	RTA	Round Head Tapping Screw(A Type)	
	RTB	Round Head Tapping Screw(B Type)	
SETSCREW	**SF**	Hex Socket Setscrew(Flat Point)	
	SC	Hex Socket Setscrew(Cup Point)	
	SS	Slotted Socket Setscrew(Flat Point)	
WASHER	**E**	E-Ring (Retaining Washer)	
	W	Flat Washer(Plain)	
	SW	Lock Washer(Spring)	
	LWI	Lock Washer (Internal Teeth)	
	LWE	Lock Washer (External Teeth)	
	TW	Trim Washer (Countersunk)	
NUT	**N**	Hex Nut	

5. EXPLODED VIEWS AND PARTS LISTS

EXPLODED VIEW-1
[MM-20(1)]


①
②
⑫
⑬
4-O
M3x6
⑭
4-B
M2.6x4(BLK Ni)
4-BTB
M3x8
2-B
M3x6(BLK Ni)
⑮
⑳
LWE Ø3
PTT
M3x6
㉑
⑲
⑱
⑯
⑰
③
㉒
㉓
⑤
㉔
2-P
M3x6
④
4-BTA
M3x6
㉘
⑥
2-P
M3x6
3-BTB
M3x8
㉕
2-P
M3x6
⑦
㉙
2-B
M4x6
⑧
2-BTA
M3x8
2-PTT
M3x6
㉜
⑨
㉖
㉝
㉚
BTA
M3x8
㉗
㉞
⑭
LWE
Ø3
⑩
P M3x8
㉟
㉛
3-B
M3x8
(BLK Ni)
P M3x6
2-P
M3x6
⑪
㊱
2-P
M3x6
5-BTB
M3x8

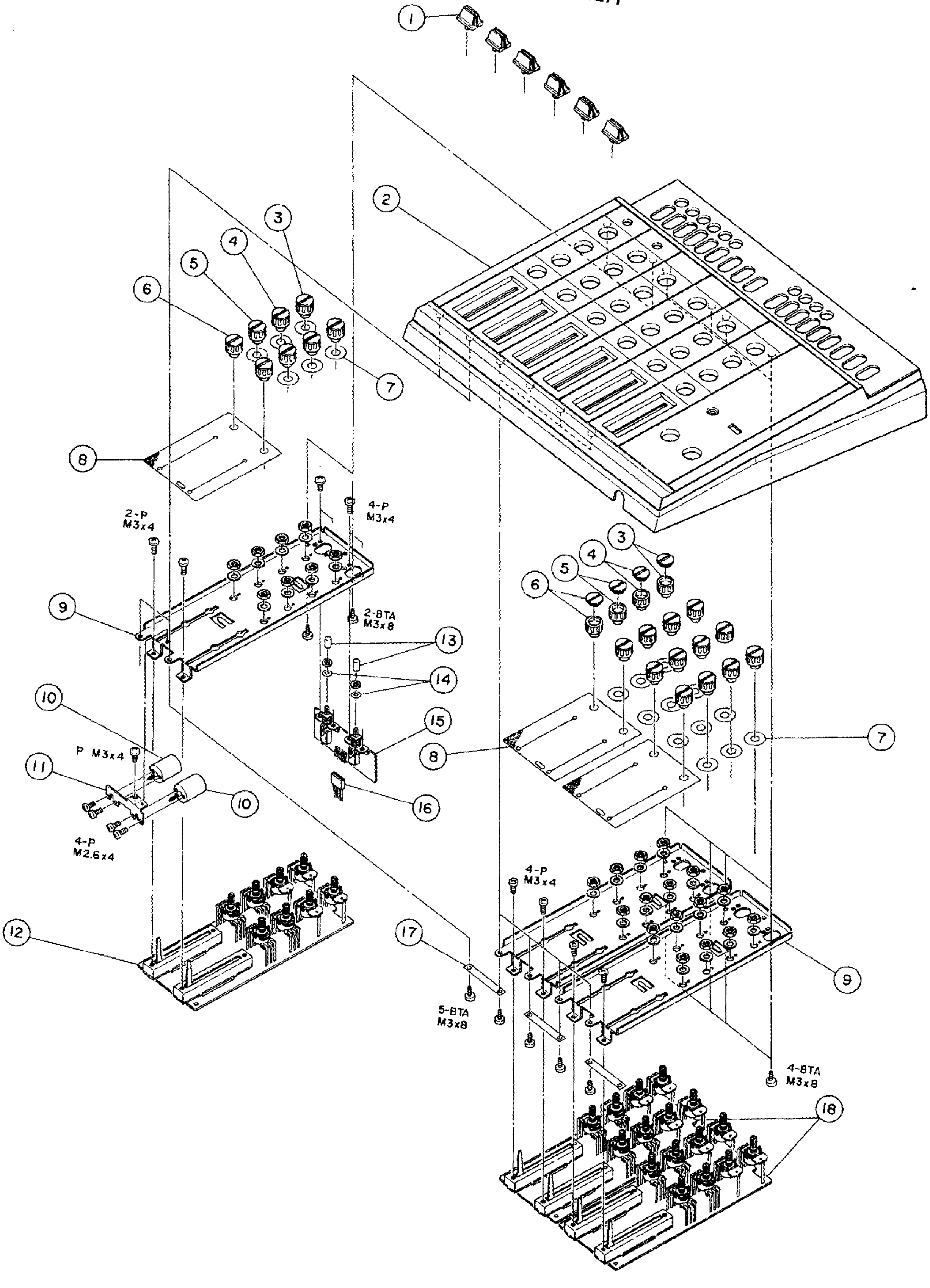
EXPLODED VIEW-1 [MM-20(1)]

Parts marked with *require longer delivery time than regular parts.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
1 - 1	5330505900	Pin Plug, Shorting	
1 - 2	*5640020400	Case Assy, Top; A [J]	
	*5640020410	Case Assy, Top; A [All except J]	
1 - 3	*5330505400	Jack Assy, Pin; 24P	
1 - 4	*5330505300	Jack Assy, Pin; 22P	
1 - 5	*5800137300	Bracket, Jack Assy	
1 - 6	*5200045000	PCB-127 Assy, IN/OUTPUT	
1 - 7	*51221680000	Connector Socket, 6P	
1 - 8		Connector Socket, 7P	
1 - 9		Connector Socket, 10 P	
1 - 10	*5800219701	Plate Assy, Shield; A	
1 - 11	*5640020500	Case Assy, Bottom; A	
1 - 12	⚠ 5128034000	Cord, AC Power [J, GE]	
	⚠ 5128075000	Cord, AC Power [C]	
	⚠ 5350008200	Cord, AC Power [E]	
	⚠ 5128047000	Cord, AC Power [UK]	
	⚠ 5350008300	Cord, AC Power [A]	
	⚠ 5128098000	Cord, AC Power [US]	
1 - 13	6052007000	Jack, CANON	
1 - 14	*5534878000	Push Rivet	
1 - 15	*5800137401	Panel, Rear	
1 - 16	*5534660000	Strain Relief, Cord; 4N-4 [All except UK, US]	
	*5534661000	Strain Relief, Cord; 4K-1 [UK, US]	
1 - 17	*5800137100	Plate, Strain Relief	
1 - 18	*5334013500	Socket, DIN; 6P	
1 - 19	*5334013400	Socket, DIN; 3P	
1 - 20	*5330505500	Jack Assy, Pin; 8P	
1 - 21	5800149800	Knob Assy, N	
1 - 22	5800149600	Knob Assy, G	
1 - 23	6006086000	Button, Power Switch	
1 - 24	*6037595100	Screen, VR Knob	
1 - 25	*5800137501	Chassis, Power	
1 - 26	5124026000	Jack, HEADPHONES	
1 - 27	*5200045401	PCB-103 Assy, MASTER MONITOR	
1 - 28	⚠ *5320008901	Transformer, Power [J]	
	⚠ *5320009000	Transformer, Power [US]	
	⚠ *5320009100	Transformer, Power [GE]	
	⚠ *5320009200	Transformer, Power [E, UK, A]	
	⚠ *5320009701	Transformer, Power [C]	
1 - 29	*5200045300	PCB-133 Assy, POWER SUPPLY	
1 - 30	⚠ 5134046000	Switch, Power [J, US, C, GE]	
	⚠ *5134011000	Switch, Power [E, UK, A]	
1 - 31	⚠ 5052905000	Spark Killer, 0.1μF + 120Ω/300VAC [J]	
	⚠ *5052907000	Spark Killer, 0.01μF + 300Ω/300VAC [GE]	
	⚠ *5052910000	Spark Killer, 0.033μF + 120Ω/125V [US]	
	⚠ *5052911000	Spark Killer, 0.033μF + 120Ω/250V [C]	
	⚠ *5267702500	Spark Killer, 4700pF/250V [E, UK, A]	
1 - 32	*5200045200	PCB-143 Assy, LED	
1 - 33	*5800136900	Bracket, Selector [GE, E, UK, A]	
1 - 34	*5043506000	Socket, Voltage Selector [GE]	
1 - 35	*5043299000	Plug, Voltage Selector [GE]	
1 - 36	*5200045100	PCB Assy, FUSE [E, UK, A]	

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

EXPLODED VIEW-2
[MM-20(2)]


1
2
3
4
5
6
7
8
2-P
M3x4
4-P
M3x4
9
2-BTA
M3x8
13
14
10
15
P M3x4
11
10
16
4-P
M2.6x4
12
17
5-BTA
M3x8
3
4
5
6
7
8
4-P
M3x4
9
4-BTA
M3x8
18

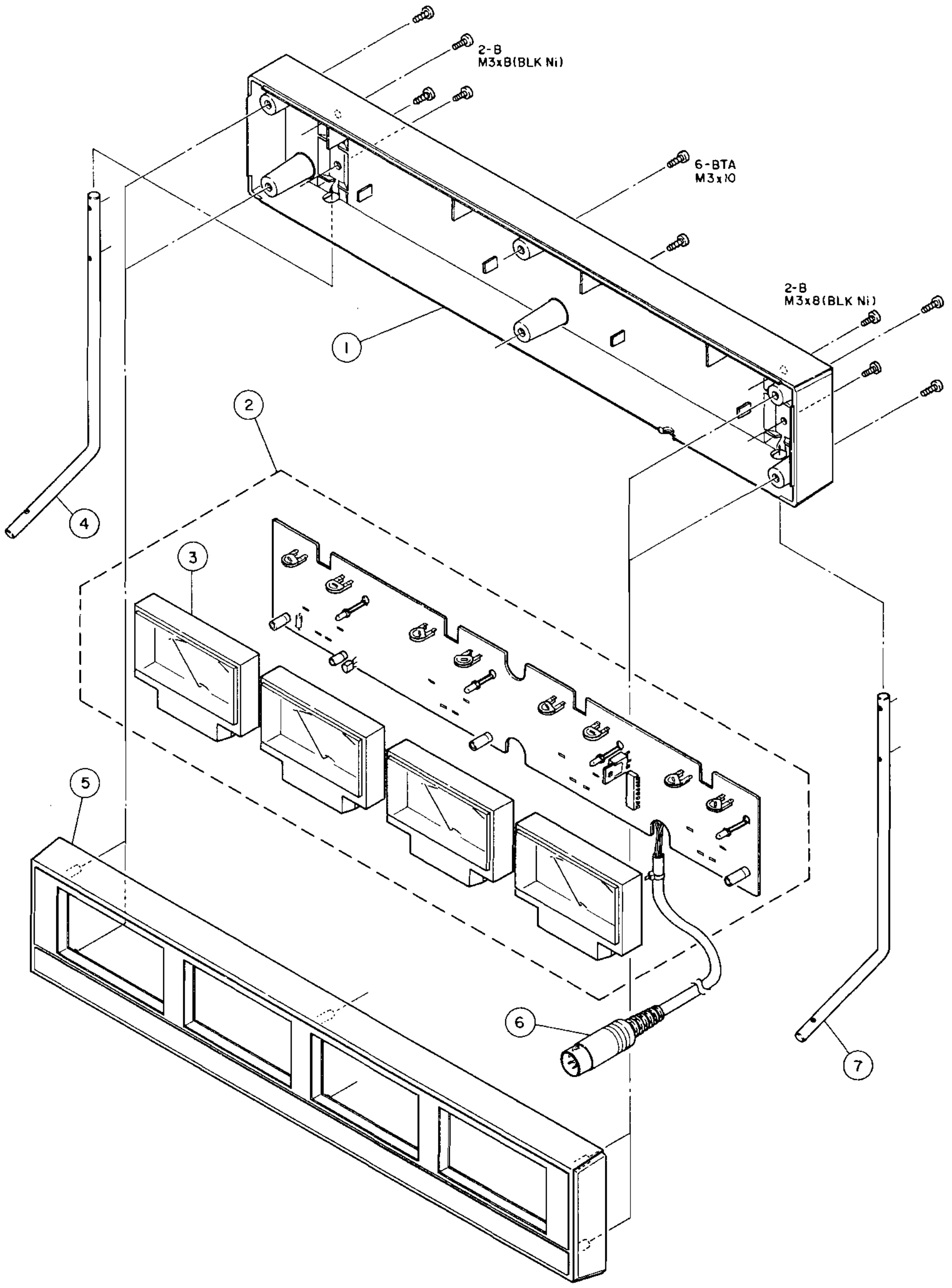
EXPLODED VIEW-2 [MM-20(2)]

Parts marked with *require longer delivery time than regular parts.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
2 - 1	5800149200	Knob Assy, Fader	
2 - 2	*5640020400	Case Assy, Top; A [J]	
	*5640020410	Case Assy, Top; A [All except J]	
2 - 3	5800149700	Knob Assy, R	
2 - 4	5800149900	Knob Assy, Y	
2 - 5	5800149800	Knob Assy, N	
2 - 6	5800149500	Knob Assy, B	
2 - 7	*6037595100	Screen, VR Knob	
2 - 8	*5800149100	Screen	
2 - 9	*5800137200	Chassis, Ampl.	
2 - 10	6046507100	Transformer, Microphone	
2 - 11	*5800137000	Bracket, Transformer	
2 - 12	*5200044600	PCB-106 Assy, MIC AMPL	
2 - 13	6006087000	Button, Push Switch	
2 - 14	*6006096000	Screen, Push Switch Button	
2 - 15	*5200044500	PCB-102 Assy, MIC ATT	
2 - 16		Connector Scoket; 6P	
2 - 17	*5800148800	Bar, Buss	
2 - 18	*5200044801	PCB-102 Assy, LINE AMPL	

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

EXPLODED VIEW-3
[MU-20]


2-B
M3x8(BLK Ni)
6-BTA
M3x10
2-B
M3x8(BLK Ni)
①
②
③
④
⑤
⑥
⑦

EXPLODED VIEW-3 [MU-2]

Parts marked with *require longer delivery time than regular parts.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
3 - 1	*5800141500	Case, Meter; Rear	
3 - 2	*5200043801	PCB-114 Assy, METER AMPL.	
3 - 3	5296002200	Meter	
3 - 4	*5800141301	Angle	
3 - 5	*5800141400	Case, Meter; Front [J]	
	*5800152100	Case, Meter; Front [All except J]	
3 - 6	*5350506200	Cord, DIN; 6P	

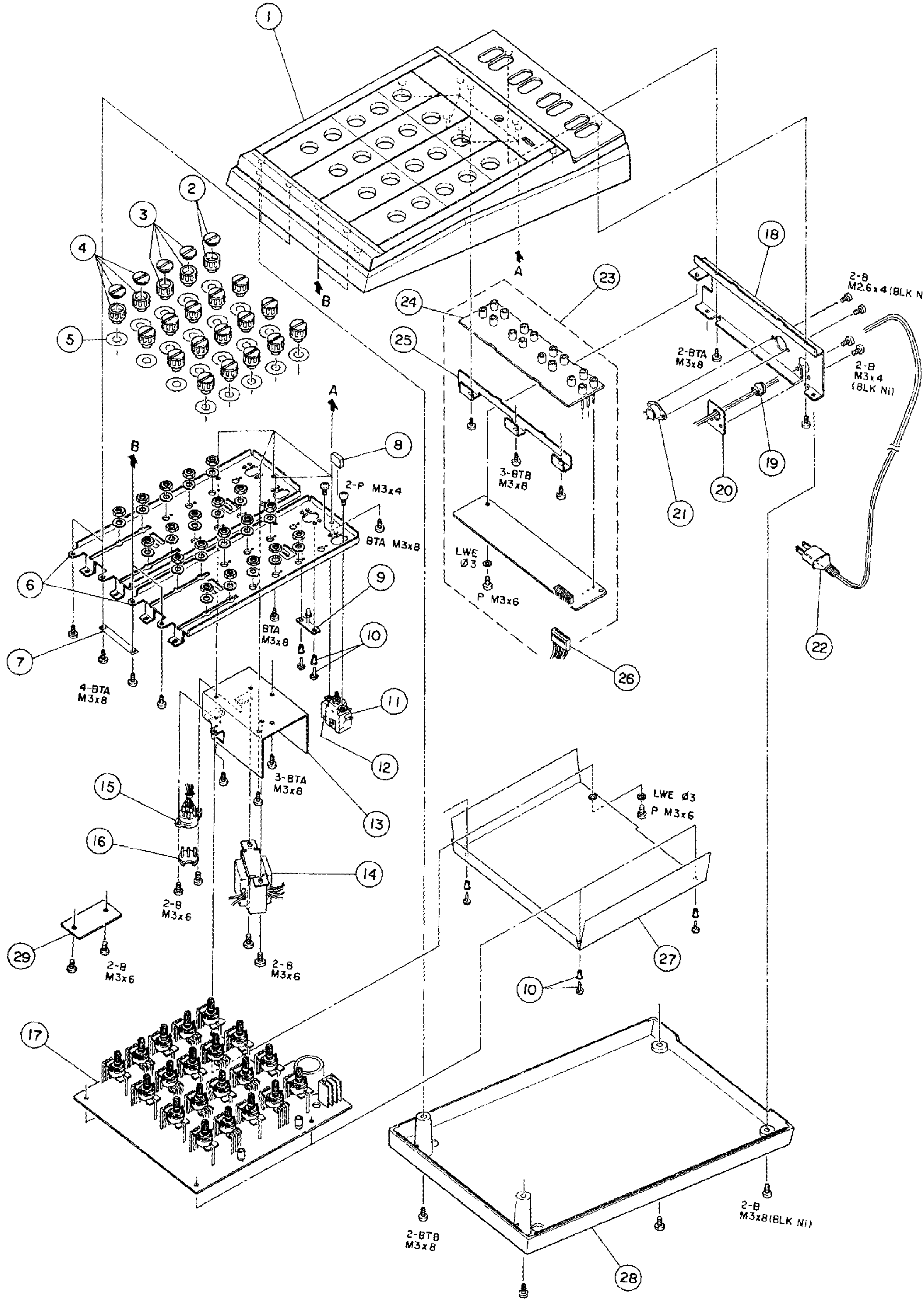
[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

INCLUDED ACCESSORIES

Parts marked with *require longer delivery time than regular parts.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
	*5700015800	SYSTEM-20 Owner's Manual	MM-20
	*5700016100	SYSTEM-20 Owner's Manual	PE-20, EX-20
	*5330505900	Pin Plug, Shorting	MU-20

EXPLODED VIEW-4
[PE-20]


1
2
3
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5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
A
B
2-P M3x4
BTA M3x8
4-BTA M3x8
BTA M3x8
3-BTA M3x8
2-B M3x6
2-B M3x6
2-B M3x6
3-BTB M3x8
LWE Ø3
P M3x6
2-BTA M3x8
2-B M2.6x4 (BLK Ni)
2-B M3x4 (BLK Ni)
LWE Ø3
P M3x6
2-BTB M3x8
2-B M3x8 (BLK Ni)

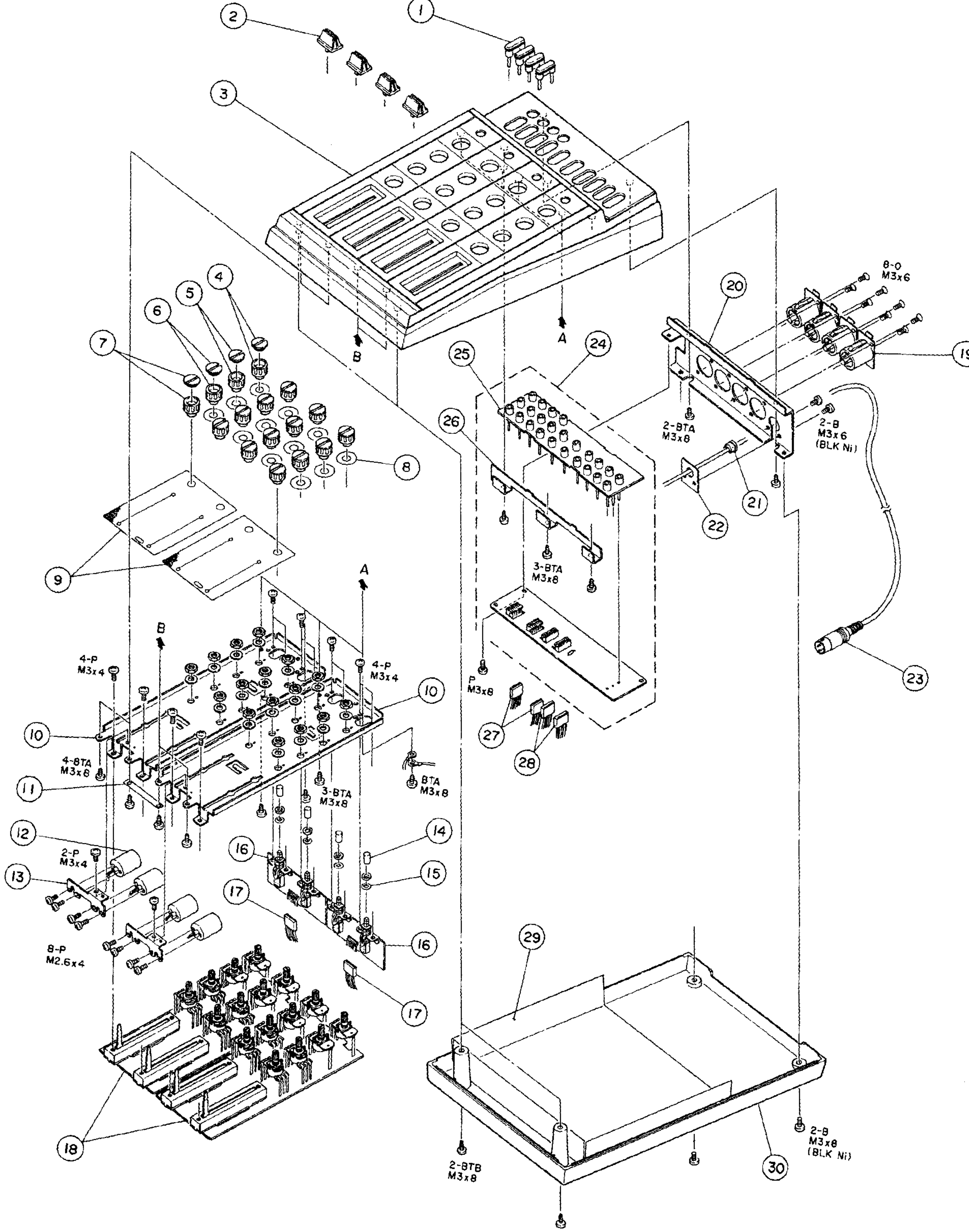
EXPLODED VIEW-4 [PE-20]

Parts marked with *require longer delivery time than regular parts.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
4 - 1	*5640019900	Case Assy, Top; C [J]	
	*5640019910	Case Assy, Top; C [All except J]	
4 - 2	5800149900	Knob Assy, Y	
4 - 3	5800149800	Knob Assy, N	
4 - 4	5800149600	Knob Assy, G	
4 - 5	*6037595100	Screen, VR Knob	
4 - 6	*5800137200	Chassis, Ampl.	
4 - 7	*5800148800	Bar, Buss	
4 - 8	6006086000	Button, Power Switch	
4 - 9	*5200043600	PCB-142 Assy, LED	
4 - 10	*5534118000	Push Rivet	
4 - 11	⚠ 5134046000	Switch, Power [J, GE, US, C]	
	⚠ 5134011000	Switch, Power [E, UK, A]	
4 - 12	⚠ 5052905000	Spark Killer, 0.1μF + 120Ω/300VAC [J]	
	⚠ *5052907000	Spark Killer, 0.01μF + 300Ω/300VAC [GE]	
	⚠ *5052910000	Spark Killer, 0.033μF + 120Ω/125V [US]	
	⚠ *5052911000	Spark Killer, 0.033μF + 120Ω/250V [C]	
	⚠ *5267702500	Spark Killer, 4700pF/250V [E, UK, A]	
4 - 13	*5800148701	Plate, Shield	
4 - 14	⚠ *5320008300	Transformer, Power [J]	
	⚠ *5320008400	Transformer, Power [US]	
	⚠ *5320008800	Transformer, Power [C]	
	⚠ *5320008500	Transformer, Power [GE]	
	⚠ *5320008600	Transformer, Power [E, UK, A]	
4 - 15	*5043506000	Socket, Voltage Selector [GE]	
4 - 16	*5043299000	Plug, Voltage Selector [GE]	
4 - 17	*5200043301	PCB-108 Assy, TONE CON AMPL	
4 - 18	*5800141200	Panel, Rear; C	
4 - 19	*5534660000	Strain Relief, Cord; 4N-4 [All except UK]	
	*5534661000	Strain Relief, Cord; 4K-1 [UK]	
4 - 20	*5800137100	Plate, Strain Relief	
4 - 21	*5334013400	Socket, DIN; 3P	
4 - 22	⚠ 5128034000	Cord, AC Power [J, GE]	
	⚠ 5128075000	Cord, AC Power [C]	
	⚠ 5350008200	Cord, AC Power [E]	
	⚠ 5128047000	Cord, AC Power [UK]	
	⚠ 5350008300	Cord, AC Power [A]	
	⚠ 5128098000	Cord, AC Power [US]	
4 - 23	*5200043400	PCB-125 Assy, IN/OUTPUT	
4 - 24	*5330505700	Jack Assy, Pin; 16P	
4 - 25	*5800141000	Bracket, Jack Assy	
4 - 26		Connector Socket, 10P	
4 - 27	*5800156201	Plate, Shield	
4 - 28	*5640020000	Cover Assy, Bottom; B	
4 - 29	*5200043500	PCB-135 Assy, FUSE [E, UK, A]	

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

EXPLODED VIEW-5
[EX-20]


2
1
3
A
B
20
8-O
M3x6
19
4
5
6
7
25
24
2-BTA
M3x8
2-B
M3x6
(BLK Ni)
26
21
22
8
9
3-BTA
M3x8
A
B
23
4-P
M3x4
4-P
M3x4
P
M3x8
10
27
10
28
4-BTA
M3x8
11
BTA
M3x8
3-BTA
M3x8
12
14
2-P
M3x4
16
13
15
17
16
8-P
M2.6x4
29
17
18
2-B
M3x8
(BLK Ni)
2-BTB
M3x8
30

EXPLODED VIEW-5 [EX-20]

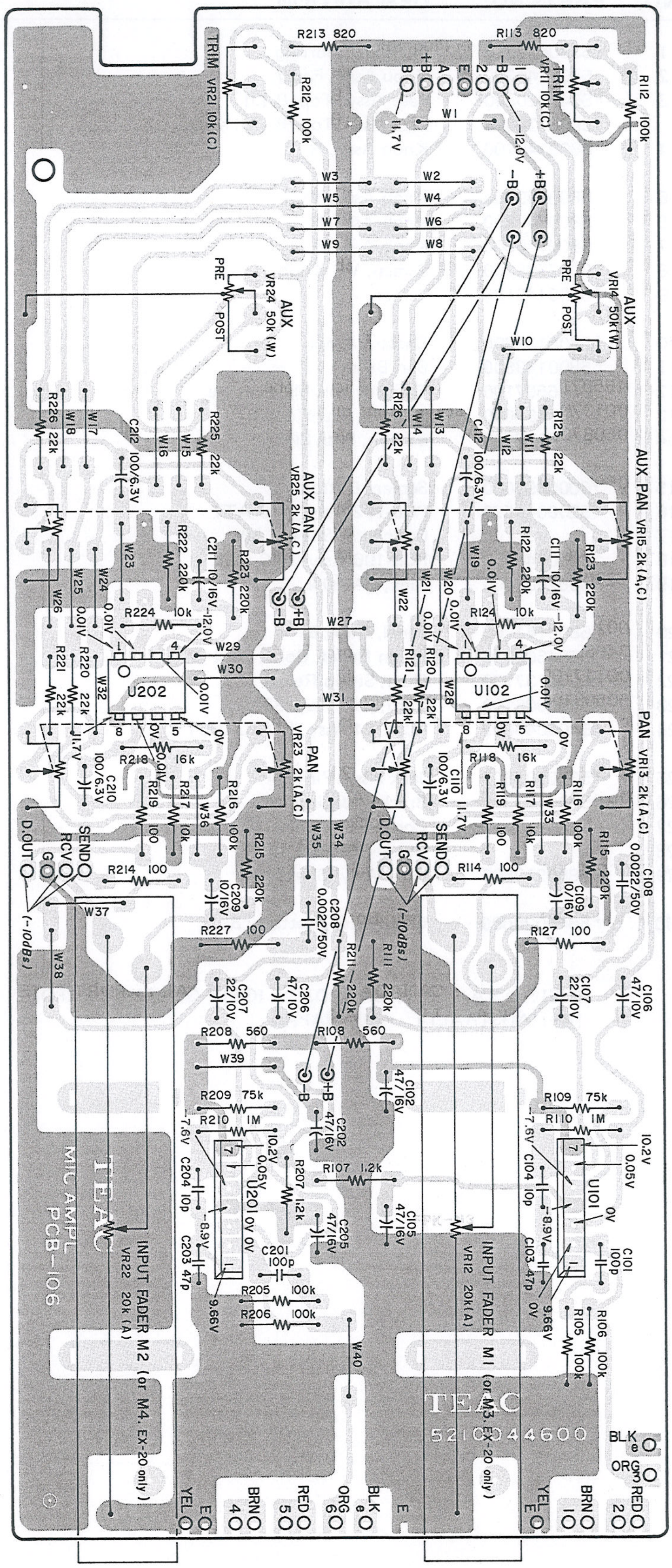
Parts marked with *require longer delivery time than regular parts.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
5 - 1	*5330505900	Pin Plug, Shorting	
5 - 2	5800149200	Knob Assy, Fader	
5 - 3	*5640020300	Case Assy, Top; B [J]	
	*5640020310	Case Assy, Top; B [All except J]	
5 - 4	5800149700	Knob Assy, R	
5 - 5	5800149900	Knob Assy, Y	
5 - 6	5800149800	Knob Assy, N	
5 - 7	5800149500	Knob Assy, B	
5 - 8	*6037595100	Screen, VR Knob	
5 - 9	*5800149100	Screen	
5 - 10	*5800137200	Chassis, Ampl.	
5 - 11	*5800148800	Bar, Buss	
5 - 12	6046507100	Transformer, Microphone	
5 - 13	*5800137000	Bracket, Transformer	
5 - 14	6006087000	Button, Push Switch	
5 - 15	*6006096000	Screen, Button	
5 - 16	*5200044500	PCB-102 Assy, MIC ATT	
5 - 17		Connector Socket, 6P	
5 - 18	*5200044600	PCB-106 Assy, MIC AMPL	
5 - 19	6052007000	Jack, CANON	
5 - 20	*5800141100	Panel, Rear; B	
5 - 21	*5534662000	Strain Relief, Cord; 5N-4	
5 - 22	*5800137100	Plate, Strain Relief	
5 - 23	*5350506100	Cord, DIN Plug; 3P	
5 - 24	*5200045602	PCB-124 Assy, IN/OUTPUT	
5 - 25	*5330505601	Jack Assy, Pin; 24P	
5 - 26	*5800137300	Bracket, Jack Assy	
5 - 27		Connector Socket, 6P	
5 - 28		Connector Socket, 7P	
5 - 29	*5800219800	Plate Assy, Shield; B	
5 - 30	*5640020000	Cover Assy, Bottom; B	

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

6. PC BOARDS AND PARTS LISTS

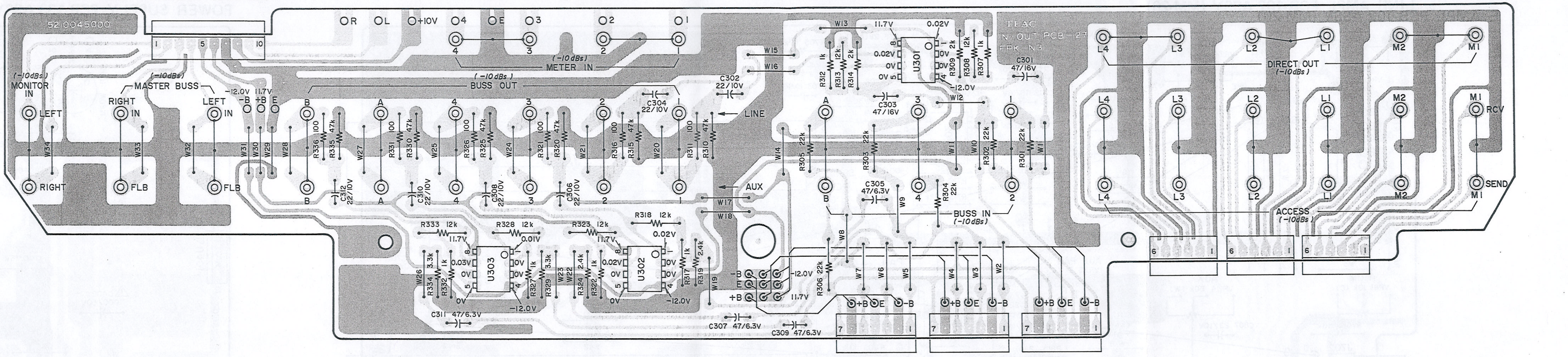
MIC AMPL PCB-106 ASSY
(MM-20/EX-20)


R213 820
R113 820
TRIM VR21 10k (C)
R212 100k
+B A E O
B O 2 O
-B 1 O
TRIM VR11 10k (C)
R112 100k
11.7V
-12.0V
W1
W2
W3
W4
W5
W6
W7
W8
W9
+B
-B
PRE
POST
AUX VR24 50k (W)
AUX VR14 50k (W)
W10
R226 22k
W18
W17
C212 100/6.3V
W16
W15
R225 22k
AUX PAN VR25 2k (A,C)
R126 22k
W14
W13
C112 100/6.3V
W12
W11
R125 22k
AUX PAN VR15 2k (A,C)
R222 220k
C211 10/16V
R223 220k
-12.0V
W23
W24
W25
W26
0.01V
R224 10k
W29
W30
W27
W31
W22
W21
W20
W19
R122 220k
C111 10/16V
R123 220k
R124 10k
-12.0V
R121
R120
U202
U102
R221 22k
R220 22k
W32
W28
R218 16k
R118 16k
0V
11.7V
100/6.3V
C210
C110
PAN VR23 2k (A,C)
PAN VR13 2k (A,C)
R219 100
R217 10k
R216 100k
W36
R119 100
R117 10k
R116 100k
W33
W35
W34
R215 220k
R115 220k
D.OUT
SEND
RCV
GND
(-10dBs)
R214 100
R114 100
W37
C209 10/16V
C208 0.0022/50V
C109 10/16V
C108 0.0022/50V
R227 100
R127 100
W38
R211 220k
R111 220k
C207 22/10V
C206 47/10V
C107 22/10V
C106 47/10V
R208 560
R108 560
W39
C102 47/16V
C202 47/16V
R209 75k
R210 1M
R109 75k
R110 1M
10.2V
0.05V
-7.6V
C204 10p
C104 10p
U201
U101
R207 12k
R107 1.2k
C205 47/16V
C105 47/16V
-8.9V
C203 47p
C103 47p
C201 100p
C101 100p
9.66V
R205 100k
R206 100k
R105 100k
R106 100k
TEAC MIC AMPL PCB-106
INPUT FADER M2 (or M4, EX-20 only) VR22 20k (A)
INPUT FADER M1 (or M3, EX-20 only) VR12 20k (A)
W40
TEAC 5210044600
BLK
ORG
RED
BRN
YEL
E
4
5
6
1
2
3

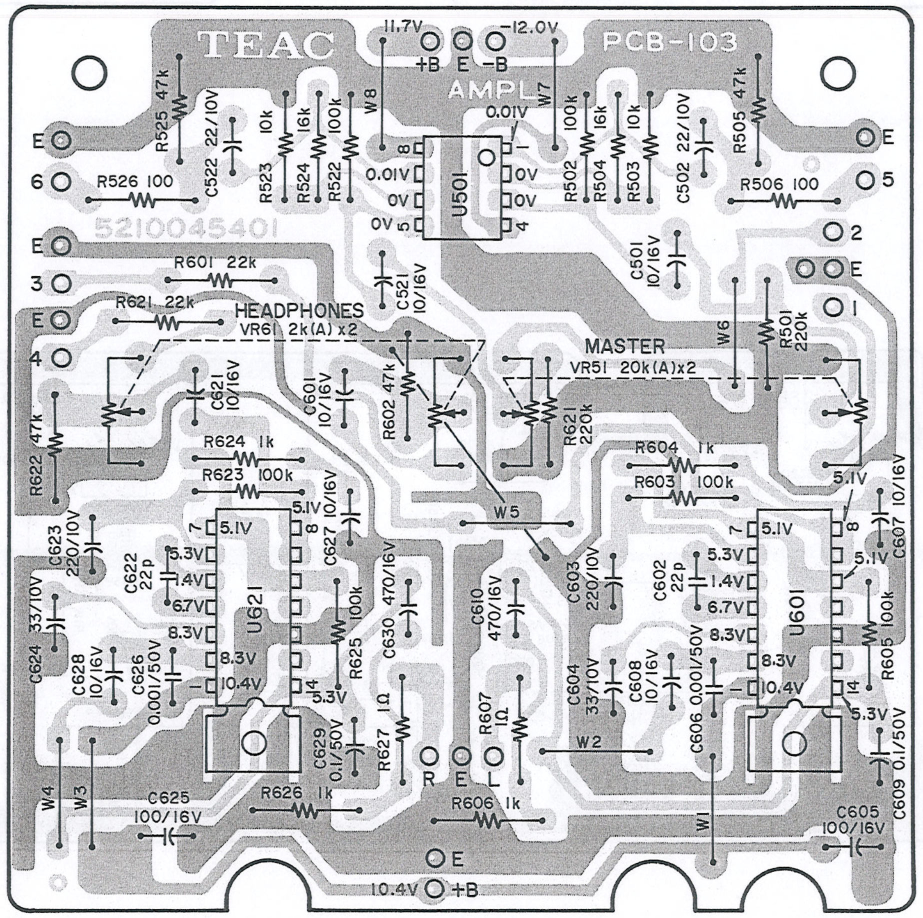
NOTES

1. PC Boards shown from foil side.
2. The following PC Boards are omitted:
   LED PCB for MM-20 and PE-20
   FUSE PCB for MM-20 and PE-20
3. All resistors are 1/4W, 5 %, unless otherwise noted.
   Resistor values are in ohms (k= kilo-ohms, M=mega-ohms).
4. All capacitor values are in micro-farads (p=pico-farads).
5. The DC voltage given in each portion are reference values measured under no-signal conditions. (Voltages given for the MM-20's power supply circuit assume that the EX-20 and MU-20 are connected as load.)
6. 0 dBs = 1 V
7. ⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components — refer to the appropriate parts list and ensure exact replacement.
8. The colors used on the PC Board illustrations have the following significance.
   ▓ : +B power supply circuit
   ▒ : -B power supply circuit
   ▨ : GND
   ░ : Other

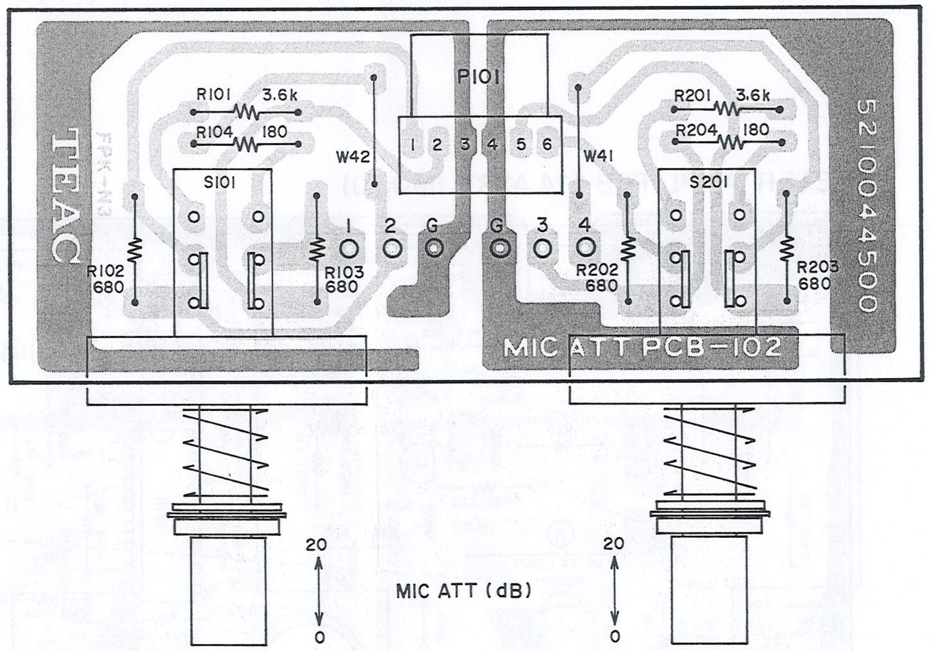
IN/OUTPUT PCB-127 ASSY (MM-20)


5210045000
TEAC
IN OUT PCB-127
FPK-N3
(-10dBs) MONITOR IN
LEFT
RIGHT
(-10dBs) MASTER BUSS
RIGHT IN
LEFT IN
FLB
-12.0V 11.7V
-B +B E
(-10dBs) BUSS OUT
(-10dBs) METER IN
R L +10V 4 E 3 2 1
B A 4 3 2 1
LINE
AUX
C302 22/10V
C304 22/10V
C301 47/16V
C303 47/16V
C305 47/6.3V
C306 22/10V
C307 47/6.3V
C308 22/10V
C309 47/6.3V
C310 22/10V
C311 47/6.3V
C312 22/10V
U301
U302
U303
R318 12k
R323 12k
R328 12k
R333 12k
11.7V
0.01V
0.02V
-12.0V
BUSS IN (-10dBs)
DIRECT OUT (-10dBs)
ACCESS (-10dBs)
L4 L3 L2 L1 M2 M1
RCV
SEND
+B E -B

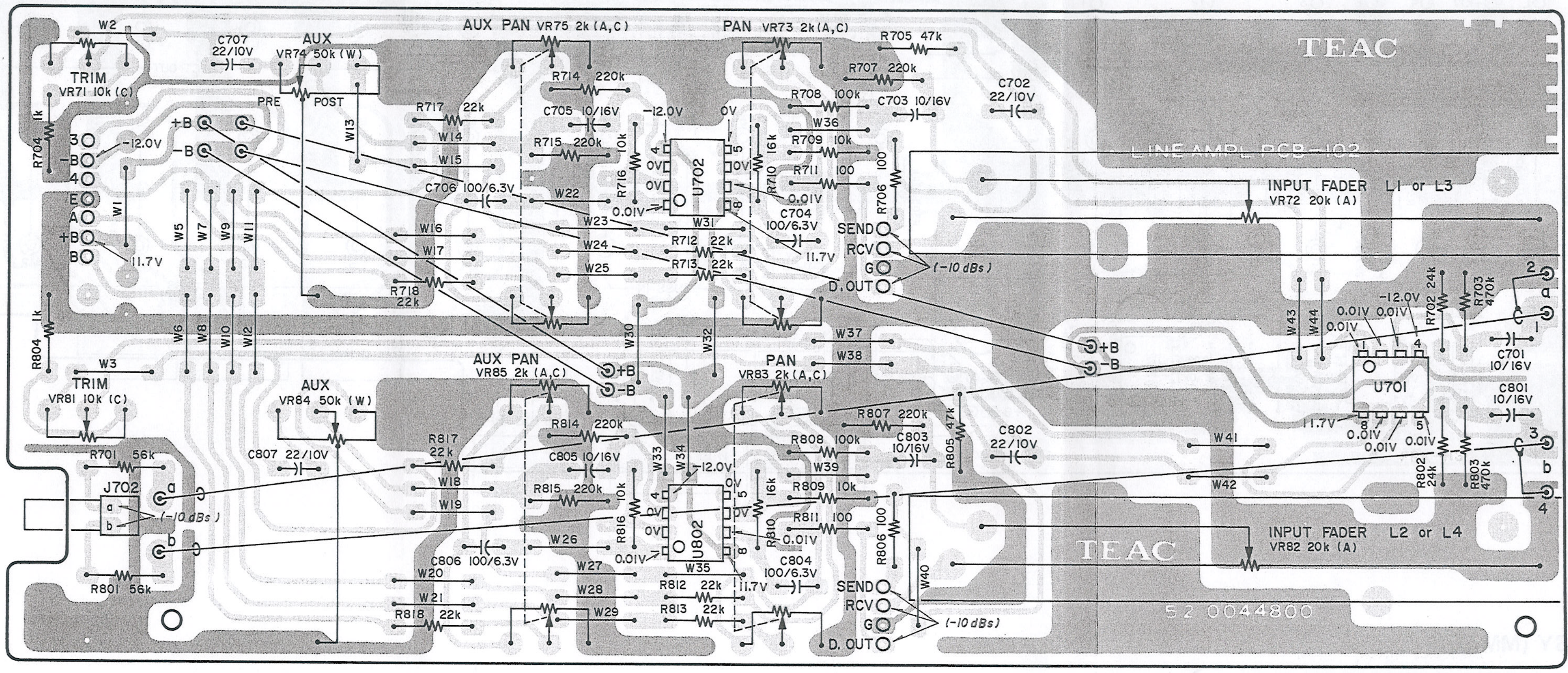
MASTER MONITOR PCB-103 ASSY (MM-20)


TEAC
PCB-103
AMPL
5210045401
11.7V -12.0V
+B E -B
HEADPHONES
VR61 2k(A)x2
MASTER
VR51 20k(A)x2
U501
U601
U621
R525 47k
R505 47k
R526 100
R506 100
R601 22k
R621 22k
R622 47k
R624 1k
R623 100k
R604 1k
R603 100k
R501 220k
C501 10/16V
C521 10/16V
C522 22/10V
C502 22/10V
C623 220/10V
C624 33/10V
C625 100/16V
C605 100/16V
C603 220/10V
C604 33/10V
C610 470/16V
C630 470/16V
R626 1k
R606 1k
R627 1Ω
R607 1Ω
R L E
10.4V +B
E 6 E 3 E 4
E 5 2 E 1

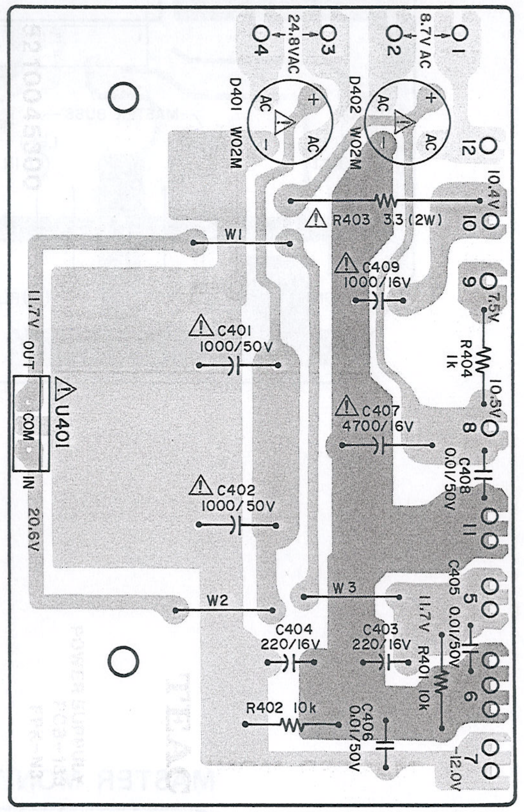
MIC ATT PCB-102 ASSY (MM-20/EX-20)


TEAC
FPK-N3
5210044500
MIC ATT PCB-102
P101
1 2 3 4 5 6
R101 3.6k
R104 180
R201 3.6k
R204 180
S101
S201
W42
W41
R102 680
R103 680
R202 680
R203 680
1 2 G G 3 4
20
0
MIC ATT (dB)
20
0

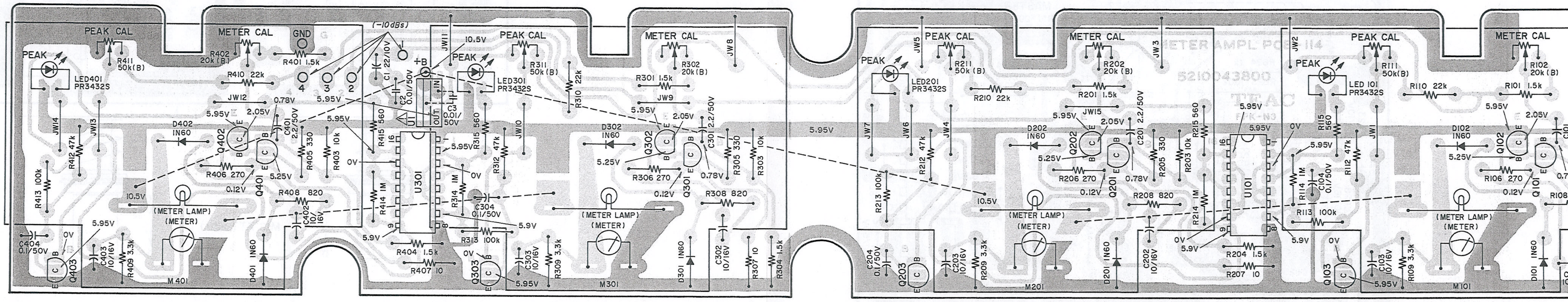
LINE AMPL PCB-102 ASSY (MM-20)


AUX PAN VR75 2k (A,C)
PAN VR73 2k (A,C)
AUX VR74 50k (W)
TRIM VR71 10k (C)
PRE
POST
C707 22/10V
R705 47k
R707 220k
R714 220k
R717 22k
C705 10/16V
-12.0V
0V
R708 100k
C703 10/16V
C702 22/10V
TEAC
LINE AMPL PCB-102
U702
R715 220k
R709 10k
R711 100
C706 100/6.3V
C704 100/6.3V
INPUT FADER L1 or L3
VR72 20k (A)
R712 22k
R713 22k
R718 22k
SEND
RCV
G
D. OUT
(-10 dBs)
11.7V
+B
-B
U701
-12.0V
0.01V
R702 24k
R703 470k
C701 10/16V
C801 10/16V
AUX PAN VR85 2k (A,C)
PAN VR83 2k (A,C)
AUX VR84 50k (W)
TRIM VR81 10k (C)
R701 56k
J702
R807 220k
R814 220k
R817 22k
C807 22/10V
C805 10/16V
R808 100k
C803 10/16V
C802 22/10V
R805 47k
R815 220k
R809 10k
R811 100
U802
C806 100/6.3V
C804 100/6.3V
R812 22k
R813 22k
R818 22k
R801 56k
R802 24k
R803 470k
INPUT FADER L2 or L4
VR82 20k (A)
52 0044800

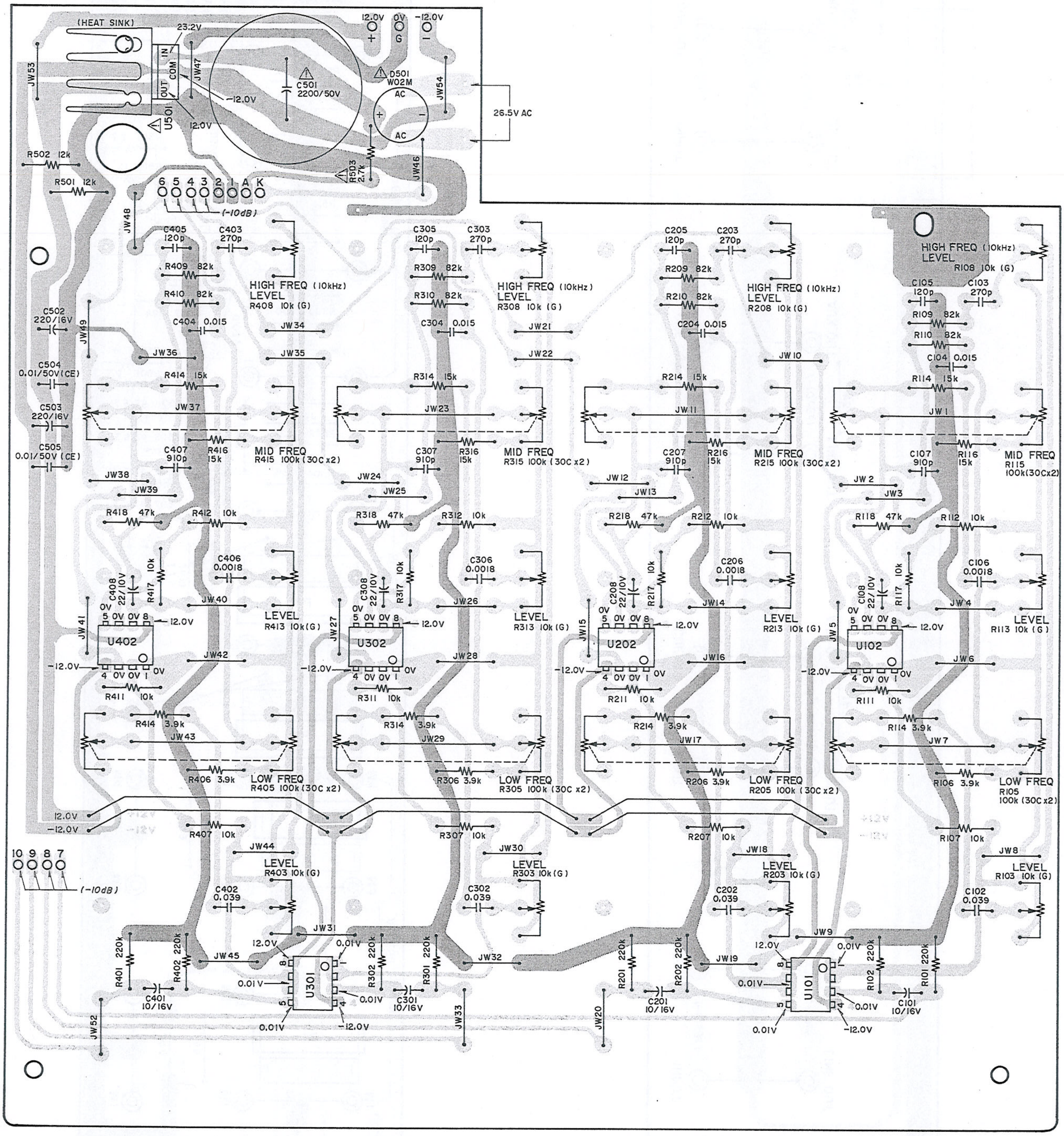
POWER SUPPLY PCB-133 ASSY (MM-20)


8.7V AC
24.8VAC
D401 W02M
D402 W02M
R403 33 (2W)
C409 1000/16V
C401 1000/50V
C407 4700/16V
C402 1000/50V
U401
11.7V OUT
COM
IN 20.6V
R404 1k
C408 0.01/50V
C405 0.01/50V
C404 220/16V
C403 220/16V
R401 10k
R402 10k
C406 0.01/50V
10.4V
10.5V
7.5V
11.7V
-12.0V
W1
W2
W3
TEAC

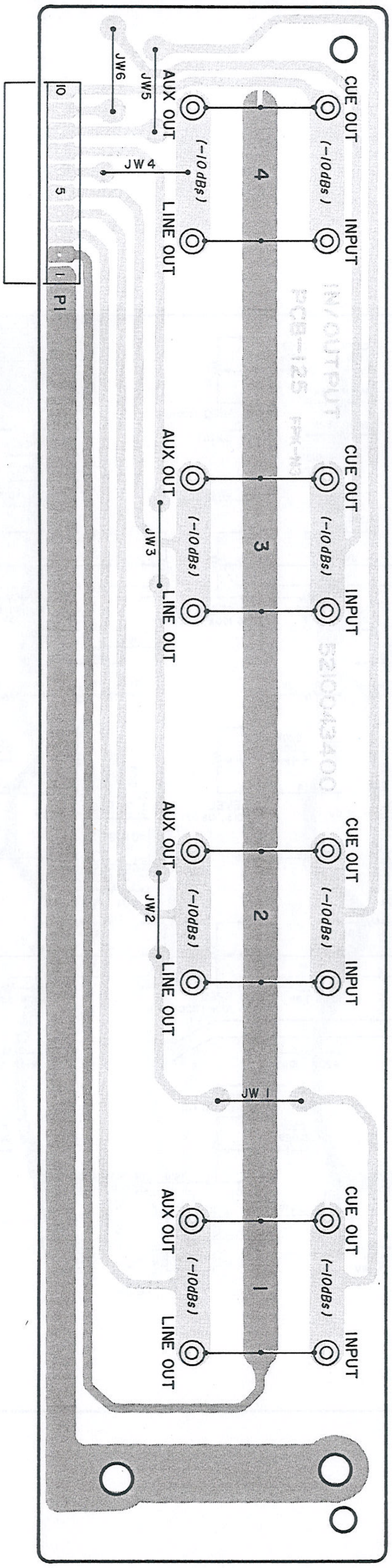
METER AMPL PCB-114 ASSY (MU-20)


PEAK CAL
METER CAL
PEAK
LED401 PR3432S
LED301 PR3432S
LED201 PR3432S
LED 101 PR3432S
R411 50k(B)
R402 20k (B)
R401 1.5k
R410 22k
GND
(-10dBs)
+B
10.5V
R311 50k (B)
R302 20k (B)
R301 1.5k
U301
U101
Q401
Q402
Q403
Q301
Q302
Q303
Q201
Q202
Q203
Q101
Q102
Q103
D402 1N60
D302 1N60
D202 1N60
D102 1N60
5.95V
2.05V
0.78V
5.25V
0.12V
(METER LAMP)
(METER)
M401
M301
M201
M101
METER AMPL PCB 114
5210043800
TEAC
R211 50k (B)
R202 20k (B)
R201 1.5k
R210 22k
R111 50k(B)
R102 20k (B)
R101 1.5k
R110 22k

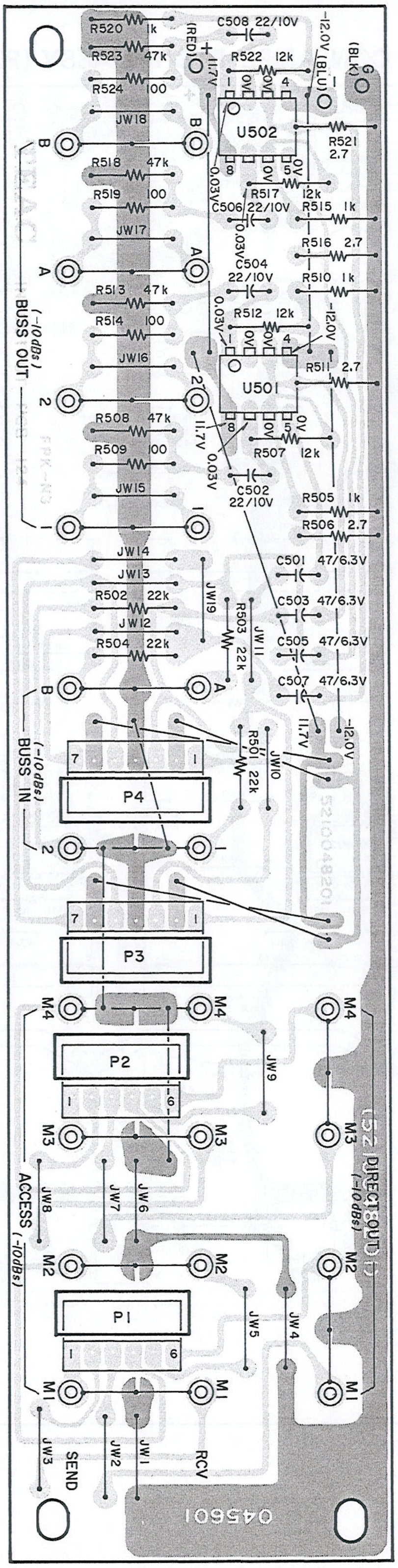
TONE CON AMPL PCB-108 ASSY (PE-20)


(HEAT SINK)
23.2V
IN
COM
OUT
U501
JW53
JW47
-12.0V
12.0V
C501 2200/50V
12.0V
0V
-12.0V
+
G
-
D501 W02M
AC
AC
JW54
26.5V AC
R503 2.7k
JW46
R502 12k
R501 12k
6 5 4 3 2 1 A K
(-10dB)
JW48
C405 120p
C403 270p
R409 82k
R410 82k
HIGH FREQ (10kHz) LEVEL R408 10k (G)
C404 0.015
JW34
JW35
JW36
C502 220/16V
JW49
C504 0.01/50V(CE)
C503 220/16V
C505 0.01/50V (CE)
R414 15k
JW37
C407 910p
R416 15k
MID FREQ R415 100k (30C x2)
JW38
JW39
R418 47k
R412 10k
C406 0.0018
C408 22/10V
R417 10k
JW40
LEVEL R413 10k (G)
JW41
U402
12.0V
-12.0V
5 0V 0V 8
4 0V 0V 1
JW42
R411 10k
R414 3.9k
JW43
R406 3.9k
LOW FREQ R405 100k (30C x2)
12.0V
-12.0V
R407 10k
JW44
LEVEL R403 10k (G)
C402 0.039
10 9 8 7
(-10dB)
R401 220k
R402 220k
C401 10/16V
JW45
JW31
U301
0.01V
12.0V
R302 220k
R301 220k
C301 10/16V
JW32
JW33
JW52
C305 120p
C303 270p
R309 82k
R310 82k
HIGH FREQ (10kHz) LEVEL R308 10k (G)
C304 0.015
JW21
JW22
R314 15k
JW23
C307 910p
R316 15k
MID FREQ R315 100k (30C x2)
JW24
JW25
R318 47k
R312 10k
C306 0.0018
C308 22/10V
R317 10k
JW26
LEVEL R313 10k (G)
JW27
U302
JW28
R311 10k
R314 3.9k
JW29
R306 3.9k
LOW FREQ R305 100k (30C x2)
R307 10k
JW30
LEVEL R303 10k (G)
C302 0.039
C205 120p
C203 270p
R209 82k
R210 82k
HIGH FREQ (10kHz) LEVEL R208 10k (G)
C204 0.015
JW10
R214 15k
JW11
C207 910p
R216 15k
MID FREQ R215 100k (30C x2)
JW12
JW13
R218 47k
R212 10k
C206 0.0018
C208 22/10V
R217 10k
JW14
LEVEL R213 10k (G)
JW15
U202
JW16
R211 10k
R214 3.9k
JW17
R206 3.9k
LOW FREQ R205 100k (30C x2)
R207 10k
JW18
LEVEL R203 10k (G)
C202 0.039
R201 220k
R202 220k
C201 10/16V
JW19
JW20
JW9
U101
0.01V
-12.0V
HIGH FREQ (10kHz) LEVEL R108 10k (G)
C105 120p
C103 270p
R109 82k
R110 82k
C104 0.015
R114 15k
JW1
C107 910p
R116 15k
MID FREQ R115 100k(30Cx2)
JW2
JW3
R118 47k
R112 10k
C106 0.0018
C108 22/10V
R117 10k
JW4
LEVEL R113 10k (G)
JW5
U102
JW6
R111 10k
R114 3.9k
JW7
R106 3.9k
LOW FREQ R105 100k (30C x2)
R107 10k
JW8
LEVEL R103 10k (G)
C102 0.039
R102 220k
R101 220k
C101 10/16V

IN/OUTPUT PCB-125 ASSY (PE-20)


CUE OUT
(-10dBs)
INPUT
AUX OUT
(-10dBs)
LINE OUT
4
3
2
1
JW1
JW2
JW3
JW4
JW5
JW6
P1
10
5
1
IN/OUTPUT
PCB-125
5210043400

IN/OUTPUT PCB-124 ASSY (EX-20)


R520 1k
R523 47k
R524 100
C508 22/10V
R522 12k
-12.0V (BLU)
(BLK) G
(RED) + 11.7V
U502
R521 2.7
R518 47k
R519 100
R517 12k
C506 22/10V
R515 1k
R516 2.7
C504 22/10V
R510 1k
R513 47k
R514 100
R512 12k
-12.0V
U501
R511 2.7
R508 47k
R509 100
R507 12k
C502 22/10V
R505 1k
R506 2.7
0.03V
11.7V
0V
5V
JW18
JW17
JW16
JW15
JW14
JW13
JW12
JW11
JW19
JW10
R502 22k
R504 22k
R503 22k
R501 22k
C501 47/6.3V
C503 47/6.3V
C505 47/6.3V
C507 47/6.3V
B
A
2
1
BUSS OUT (-10dBs)
BUSS IN (-10dBs)
P4
P3
P2
P1
7
1
6
M4
M3
M2
M1
JW9
JW8
JW7
JW6
JW5
JW4
JW3
JW2
JW1
ACCESS (-10dBs)
SEND
RCV
DIRECT OUT (-10dBs)
5210048201
045601

MIC AMPL PCB-106 ASSY (MM-20/EX-20)

REF. NO.	PARTS NO.	DESCRIPTION		
	5200044600	PCB-106 ASSY		
	5210044600	PCB-106		
	IC's			
U101, U201	5147023000	TA7136P		
U102, U202	5220411100	NJM4560DX		
	CARBON RESISTORS			
	All resistors are rated ±5% tolerance and 1/4 watt.			
R105, R205	5183130000	100kΩ		
R106, R206	5183130000	100kΩ		
R107, R207	5183084000	1.2kΩ		
R108, R208	5183076000	560Ω		
R109, R209	5183127000	75kΩ		
R110, R210	5183154000	1MΩ		
R111, R211	5183138000	220kΩ		
R112, R212	5183130000	100kΩ		
R113, R213	5183080000	820Ω		
R114, R214	5183058000	100Ω		
R115, R215	5183138000	220kΩ		
R116, R216	5183130000	100kΩ		
R117, R217	5183106000	10kΩ		
R118, R218	5183111000	16kΩ		
R119, R219	5183058000	100Ω		
R120, R220	5183114000	22kΩ		
R121, R221	5183114000	22kΩ		
R122, R222	5183138000	220kΩ		
R123, R223	5183138000	220kΩ		
R124, R224	5183106000	10kΩ		
R125, R225	5183114000	22kΩ		
R126, R226	5183114000	22kΩ		
R127, R227	5183058000	100Ω		
	CAPACITORS			
C101, C201	5054744000	Dip. Mica	100pF	
C102, C202	5173036000	Elec.	47μF	16V
C103, C203	5054742000	Dip. Mica	47pF	
C104, C204	5054740000	Dip. Mica	10pF	
C105, C205	5173036000	Elec.	47μF	16V
C106, C206	5173035000	Elec.	47μF	10V
C107, C207	5173017000	Elec.	22μF	10V
C108, C208	5170409800	Mylar	0.0022μF	50V
C109, C209	5173010000	Elec.	10μF	16V
C110, C210	5173043000	Elec.	100μF	6.3V
C111, C211	5173010000	Elec.	10μF	16V
C112, C212	5173043000	Elec.	100μF	6.3V
C113, C114	5173010000	Elec.	10μF	16V
	VARIABLE RESISTORS			
VR11, VR21	5282010100	10kΩ(C)	TRIM	
VR12, VR22	5284005001	20kΩ(A)	M1, M2	
VR13, VR23	5282407000	2kΩ(A, C)	PAN	
VR14, VR24	5282010200	50kΩ(W)	AUX	
VR15, VR25	5282407000	2kΩ(A, C)	AUX PAN	

IN/OUTPUT PCB-127 ASSY (MM-20)

REF. NO.	PARTS NO.	DESCRIPTION		
	5200045000	PCB-127 Assy		
	5210045000	PCB-127		
	IC's			
U301, U302	5147064000	NJM4559DD		
U303	5147064000	NJM4559DD		
	CARBON RESISTORS			
	All resistors are rated ±5% tolerance and 1/4 watt.			
R301～R306	5183114000	22kΩ		
R307	5183082000	1kΩ		
R308	5183108000	12kΩ		
R309	5183089000	2kΩ		
R310	5183122000	47kΩ		
R311	5183058000	100Ω		
R312	5183082000	1kΩ		
R313	5183108000	12kΩ		
R314	5183089000	2kΩ		
R315	5183122000	47kΩ		
R316	5183058000	100Ω		
R317	5183082000	1kΩ		
R318	5183108000	12kΩ		
R319	5183091000	2.4kΩ		
R320	5183122000	47kΩ		
R321	5183058000	100Ω		
R322	5183082000	1kΩ		
R323	5183108000	12kΩ		
R324	5183091000	2.4kΩ		
R325	5183122000	47kΩ		
R326	5183058000	100Ω		
R327	5183082000	1kΩ		
R328	5183108000	12kΩ		
R329	5183094000	3.3kΩ		
R330	5183122000	47kΩ		
R331	5183058000	100Ω		
R332	5183082000	1kΩ		
R333	5183108000	12kΩ		
R334	5183094000	3.3kΩ		
R355	5183122000	47kΩ		
R336	5183058000	100Ω		
	CAPACITORS			
C301	5173034000	Elec.	47μF	6.3V
C302	5173017000	Elec.	22μF	10V
C303	5173034000	Elec.	47μF	6.3V
C304	5173017000	Elec.	22μF	10V
C305	5173034000	Elec.	47μF	6.3V
C306	5173017000	Elec.	22μF	10V
C307	5173034000	Elec.	47μF	6.3V
C308	5173017000	Elec.	22μF	10V
C309	5173034000	Elec.	47μF	6.3V
C310	5173017000	Elec.	22μF	10V
C311	5173034000	Elec.	47μF	6.3V
C312	5173017000	Elec.	22μF	10V

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

REF. NO.	PARTS NO.	DESCRIPTION
	MISCELLANEOUS	
	6052380006	Connector Plug; 6P x3
	6052380007	Connector Plug; 7P x3
	6052380010	Connector Plug; 10P x1
	5330505400	Jack Assy, Pin; 24P
	5330505300	Jack Assy, Pin; 22P

MASTER MONITOR PCB-103 ASSY (MM-20)

REF. NO.	PARTS NO.	DESCRIPTION
	5200045400	PCB-103 Assy
	5210045400	PCB-103
	IC's	
U501	5147064000	NJM4559DD
U601, U621	6048613000	LA4201
	CARBON RESISTORS **All resistors are rated ±5% tolerance and 1/4 watt.**	
R501, R521	5183138000	220kΩ
R502, R522	5183130000	100kΩ
R503, R523	5183106000	10kΩ
R504, R524	5183111000	16kΩ
R505, R525	5183122000	47kΩ
R506, R526	5183058000	100Ω
R601, R621	5183114000	22kΩ
R602, R622	5183122000	47kΩ
R603, R623	5183130000	100kΩ
R604, R624	5183082000	1kΩ
R605, R625	5183130000	100kΩ
R606, R626	5183082000	1kΩ
R607, R627	5183010000	1Ω
	CAPACITORS	
C501, C521	5173010000	Elec. 10μF 16V
C502, C522	5173017000	Elec. 22μF 10V
C601, C621	5173010000	Elec. 10μF 16V
C602, C622	5054382000	Dip. Mica 22P 50V
C603, C623	5173053000	Elec. 220μF 10V
C604, C624	5173027000	Elec. 33μF 16V
C605, C625	5173045000	Elec. 100μF 16V
C606, C626	5170401800	Mylar 0.001μF 50V
C607, C627	5170010000	Elec. 10μF 16V
C608, C628	5173010000	Elec. 10μF 16V
C609, C629	5173550800	Elec. 0.1μF 50V
C610, C630	5173072000	Elec. 470μF 16V
	VARIABLE RESISTORS	
VR51	5282407300	20kΩ(A) x 2
VR61	5282407100	2kΩ(A) x 2

MIC ATT PCB-102 ASSY (MM-20/EX-20)

REF. NO.	PARTS NO.	DESCRIPTION
	5200044500	PCB-102 Assy
	5210044500	PCB-102
	CARBON RESISTORS	
R101, R201	5183095000	3.6kΩ 1/4W 5%
R102, R202	5183078000	680Ω 1/4W 5%
R103, R203	5183078000	680Ω 1/4W 5%
R104, R204	5183064000	180Ω 1/4W 5%
	SWITCHES	
S101, S201	5300021800	Push, 2-2 MIC ATT
	CONNECTOR	
P101	5122149000	Plug, 6P

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

LINE AMPL PCB-102 ASSY (MM-20)

REF. NO.	PARTS NO.	DESCRIPTION		
	5200044800	PCB-102 Assy		
	5210044800	PCB-102		
	IC's			
U701	5147064000	NJM4559DD		
U702, U802	5220411100	NJM4560DX		
	CARBON RESISTORS **All resistors are rated ±5% tolerance and 1/4 watt.**			
R701, R801	5183124000	56kΩ		
R702, R802	5183115000	24kΩ		
R703, R803	5183146000	470kΩ		
R704, R804	5183082000	1kΩ		
R705, R805	5183122000	47kΩ		
R706, R806	5183058000	100Ω		
R707, R807	5183138000	220kΩ		
R708, R808	5183130000	100kΩ		
R709, R809	5183106000	10kΩ		
R710, R810	5183111000	16kΩ		
R711, R811	5183058000	100Ω		
R712, R812	5183114000	22kΩ		
R713, R813	5183114000	22kΩ		
R714, R814	5183138000	220kΩ		
R715, R815	5183138000	220kΩ		
R716, R816	5183106000	10kΩ		
R717, R817	5183114000	22kΩ		
R718, R818	5183114000	22kΩ		
	CAPACITORS			
C701, C801	5173010000	Elec.	10μF	16V
C702, C802	5173017000	Elec.	22μF	10V
C703, C803	5173010000	Elec.	10μF	16V
C704, C804	5173043000	Elec.	100μF	6.3V
C705, C805	5173010000	Elec.	10μF	16V
C706, C806	5173043000	Elec.	100μF	6.3V
C707, C807	5173017000	Elec.	22μF	10V
	VARIABLE RESISTORS			
VR71, VR81	5282010100	10kΩ(C)	TRIM	
VR72, VR82	5284005001	20kΩ(A)	L1 ~L4	
VR73, VR83	5282407000	2kΩ(A, C)	PAN	
VR74, VR84	5282010200	50kΩ(W)	AUX	
VR75, VR85	5282407000	2kΩ(A, C)	AUX PAN	
	CONNECTOR			
J702	5122145000	Plug, 2P		

POWER SUPPLY PCB-133 ASSY (MM-20)

REF. NO.	PARTS NO.	DESCRIPTION			
	5200045300	PCB-133 Assy			
	5210045300	PCB-133			
	REGURATOR				
U401	⚠6048616000	FS7824M			
	DIODES				
D401, D402	⚠6048371000	W02M			
	RESISTORS **All resistors are rated ±5% tolerance, 1/4 watt and are carbon type, unless otherwise noted.**				
R401, R402	5183106000	10kΩ			
R403	⚠5184306000	3.3Ω	2W	Cement	
R404	5183082000	1kΩ			
	CAPACITORS				
C401, C402	⚠5173084000	Elec.	1000μF	50V	
C403, C404	5173054000	Elec.	220μF	16V	
C405, C406	5172336000	Ceramic	0.01μF		
C407	⚠5173097000	Elec.	4700μF	16V	
C408	5172336000	Ceramic	0.01μF		
C409	⚠5173081000	Elec.	1000μF	16V	

LED PCB-143 ASSY (MM-20) (PC Board Omitted)

REF. NO.	PARTS NO.	DESCRIPTION
	5200045200	PCB-143 Assy
	5210045200	PCB-143
D403	5225007000	LED (Red)

FUSE PCB ASSY (E, UK, A) (MM-20)

(PC Board Omitted)

REF. NO.	PARTS NO.	DESCRIPTION	
	5200045100	PCB Assy	
	5210045100	PCB	
	⚠5041138000	Fuse, T500mA	250V
	⚠5041141000	Fuse, 1A	250V
	5142087000	Holder, Fuse	

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

METER AMPL PCB-114 ASSY (MU-20)

REF. NO.		PARTS NO.	DESCRIPTION		
		5200043801	PCB-114 Assy		
		5210043800	PCB-114		
		IC's			
U1		5220411000	Regurator, NJM78M06A		
U101, U301		5220014000	MSM4049RS		
		TRANSISTORS			
Q101	•	5145151000	2SC1815GR		
Q102	•	5145149000	2SA970GR		
Q103	•	5145151000	2SC1815GR		
		DIODES			
D101	•	5042213000	IN60		
D102	•	5042213000	IN60		
LED101	•	5225006900	LED, PR3432S		
		CARBON RESISTORS			
		All resistors are rated ±5% tolerance and 1/4 watt.			
R101	•	5183086000	1.5kΩ		
R103	•	5183106000	10kΩ		
R104	•	5183086000	1.5kΩ		
R105	•	5183070000	330Ω		
R106	•	5183068000	270Ω		
R107	•	5183034000	10Ω		
R108	•	5183080000	820Ω		
R109	•	5183094000	3.3kΩ		
R110	•	5183114000	22kΩ		
R112	•	5183122000	47kΩ		
R113	•	5183130000	100kΩ		
R114	•	5183154000	1MΩ		
R115	•	5183076000	560Ω		
		CAPACITORS			
C1		5173018800	Elec.	22μF	16V
C2		5054204000	Ceramic	0.01μF	
C3		5054204000	Ceramic	0.01μF	
C101	•	5172996800	Elec.	2.2μF	50V
C102	•	5173010800	Elec.	10μF	16V
C103	•	5173010800	Elec.	10μF	16V
C104	•	5171580000	Elec.	0.1μF	50V (LR)
		VARIABLE RESISTORS			
R102	•	5280001102	Semi-fixed, 20kΩ(B)		
R111	•	5280001502	Semi-fixed, 50kΩ(B)		
		METERS			
M101	•	5296002200	VU		

• : 1 ch
(2ch : 200's, 3ch : 300's, 4ch : 400's)

TONE CON AMPL PCB-108 ASSY (PE-20)

REF. NO.		PARTS NO.	DESCRIPTION		
		5200043300	PCB-108 Assy		
		5210043300	PCB-108		
		IC's			
U101		5147064000	NJM4559DD		
U102, U202		5147064000	NJM4559DD		
U301		5147064000	NJM4559DD		
U302, U402		5147064000	NJM4559DD		
U501	⚠	6048616000	Regulator, 78M24		
		5553132000	Heatsink		
		DIODE			
D501	⚠	6048371000	W02M		
		CARBON RESISTORS			
		All resistors are rated ±5% tolerance and 1/4 watt.			
R101	•	5183138000	220kΩ		
R102	•	5183138000	220kΩ		
R104	•	5183096000	3.9kΩ		
R106	•	5183096000	3.9kΩ		
R107	•	5183106000	10kΩ		
R109	•	5183128000	82kΩ		
R110	•	5183128000	82kΩ		
R111	•	5183106000	10kΩ		
R112	•	5183106000	10kΩ		
R114	•	5183110000	15kΩ		
R116	•	5183110000	15kΩ		
R117	•	5183106000	10kΩ		
R118	•	5183122000	47kΩ		
R501, R502		5183108000	12kΩ		
R503	⚠	5183092000	2.7kΩ		
		CAPACITORS			
C101	•	5173010800	Elec.	10μF	16V
C102	•	5170439000	Mylar	0.039μF	100V
C103	•	5171730000	Polyst.	270pF	50V
C104	•	5170429000	Mylar	0.015μF	100V
C105	•	5171722000	Polyst.	120pF	50V
C106	•	5170407000	Mylar	0.0018μF	100V
C107	•	5172827000	Polyst.	910pF	50V
C108	•	5173018800	Elec.	22μF	16V
C501	⚠	6043275000	Elec.	2200μF	50V
C502, C503		5173054800	Elec.	220μF	16V
C504, C505		5054204000	Ceramic	0.01μF	50V
		VARIABLE RESISTORS			
R103	•	5282009501	10kΩ(G) LOW FREQ LEVEL		
R105	•	5282406901	100kΩ x 2(C, C) LOW FREQ		
R108	•	5282009501	10kΩ(G) HIGH FREQ LEVEL		
R113	•	5282009501	10kΩ(G) MID FREQ LEVEL		
R115	•	5282406901	100kΩ x 2(C, C) MID FREQ		

• : 1 ch
(2ch : 200's, 3ch : 300's, 4ch : 400's)

[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

IN/OUTPUT PCB-125 ASSY (PE-20)

REF. NO.	PARTS NO.	DESCRIPTION
	5200043400	PCB-125 Assy
	5210043400	PCB-125
	5330505700	Jack Assy, Pin; 16P
P1	6052380010	Connector Plug, 10P

LED PCB-142 ASSY (PE-20) (PC Board Omitted)

REF. NO.	PARTS NO.	DESCRIPTION
	5200043600	PCB-142 Assy
	5210043600	PCB-142
D1	5225007000	LED, PR5638S

FUSE PCB-135 ASSY (E, UK, A) (PE-20)

(PC Board Omitted)

REF. NO.	PARTS NO.	DESCRIPTION
	5200043500	PCB-135 Assy
	5210043500	PCB-135
F1	⚠ 5041138000	Fuse, T500mA 250V
	5142087000	Holder, Fuse

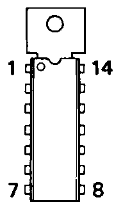
IN/OUTPUT PCB-124 ASSY (EX-20)

REF. NO.	PARTS NO.	DESCRIPTION
	5200045602	PCB-124 Assy
	5210045602	PCB-124
	IC's	
U501, U502	5147064000	NJM4559DD
	CARBON RESISTORS **All resistors are rated ±5% tolerance and 1/4 watt.**	
R501~R504	5183114000	22kΩ
R505	5183082000	1kΩ
R506	5183092000	2.7kΩ
R507	5183108000	12kΩ
R508	5183122000	47kΩ
R509	5183058000	100Ω
R510	5183082000	1kΩ
R511	5183092000	2.7kΩ
R512	5183108000	12kΩ
R513	5183122000	47kΩ
R514	5183058000	100Ω
R515	5183082000	1kΩ
R516	5183092000	2.7kΩ
R517	5183108000	12kΩ
R518	5183122000	47kΩ
R519	5183058000	100Ω
R520	5183082000	1kΩ
R521	5183092000	2.7kΩ
R522	5183108000	12kΩ
R523	5183122000	47kΩ
R524	5183058000	100Ω
	CAPACITORS	
C501	5173035800	Elec. 47μF 10V
C502	5173017800	Elec. 22μF 10V
C503	5173035800	Elec. 47μF 10V
C504	5173017800	Elec. 22μF 10V
C505	5173035800	Elec. 47μF 10V
C506	5173017800	Elec. 22μF 10V
C507	5173035800	Elec. 47μF 10V
C508	5173017800	Elec. 22μF 10V
	CONNECTORS	
P1, P2	6052380006	Plug, 6P
P3, P4	6052380007	Plug, 7P
	5330505601	Pin Jack, 24P

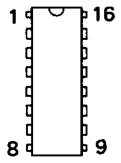
[US] : U.S.A. [C] : CANADA [GE] : GENERAL EXPORT [E] : EUROPE [UK] : U.K.
[A] : AUSTRALIA [J] : JAPAN

7. SEMICONDUCTORS LISTS

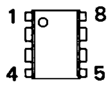
LA4201
(TOP VIEW)



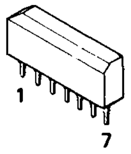
MSM4049RS
(TOP VIEW)



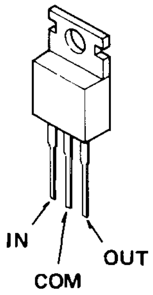
NJM4559DD
NJM4560DX
(TOP VIEW)



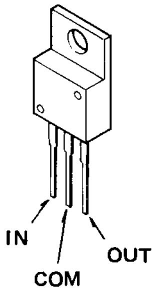
TA7136P



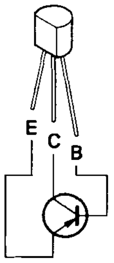
FS7824M



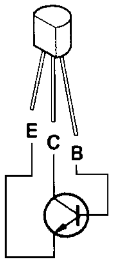
NJM78M06A



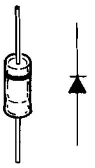
2SA970GR



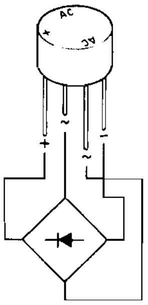
2SC1815GR



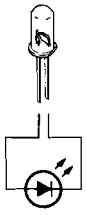
1N60



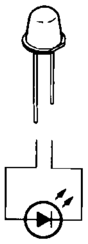
W02M



PR3432S

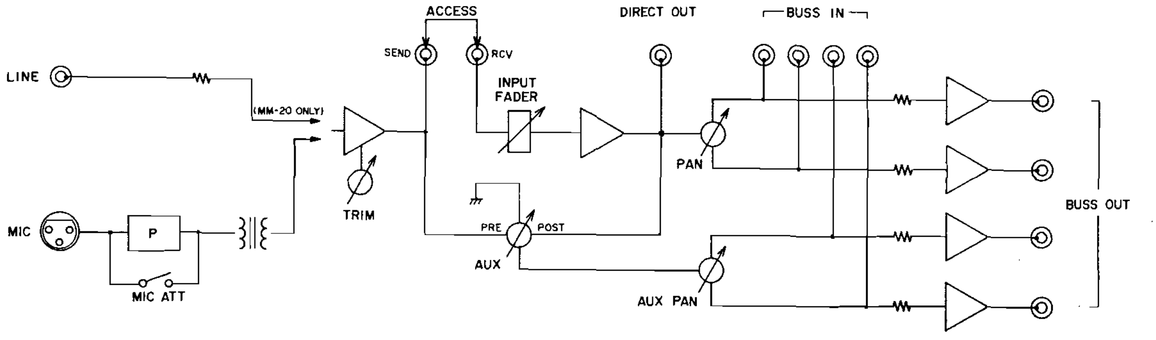


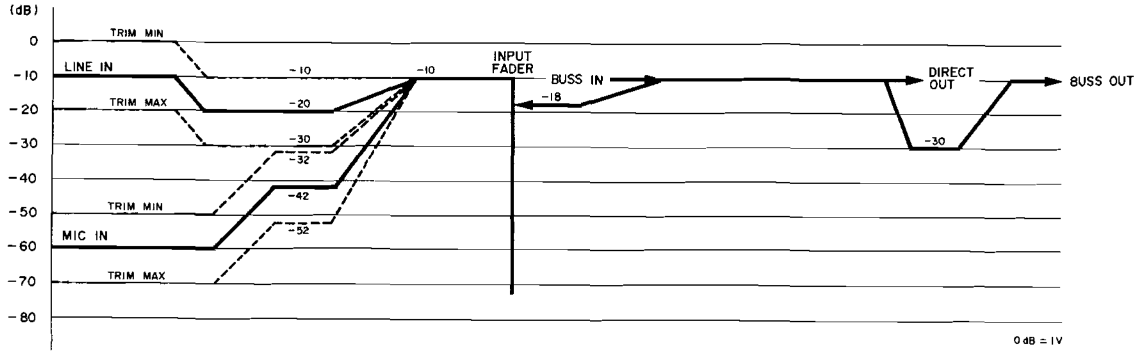
PR5638S



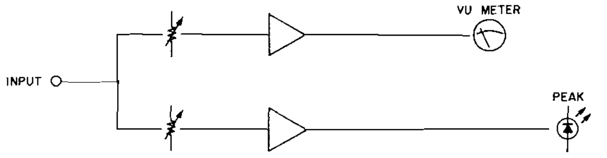
8. LEVEL DIAGRAMS

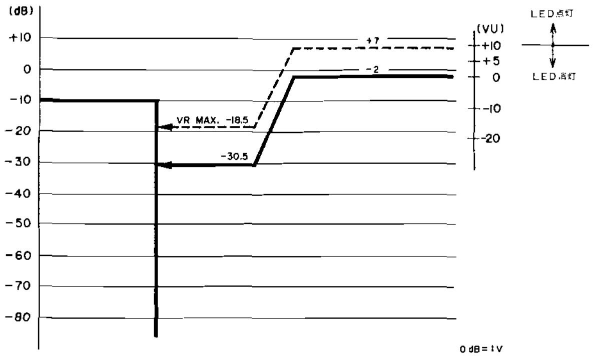
MM-20/EX-20


ACCESS
SEND
RCV
DIRECT OUT
BUSS IN
LINE
(MM-20 ONLY)
INPUT FADER
TRIM
PAN
MIC
P
MIC ATT
PRE
POST
AUX
AUX PAN
BUSS OUT

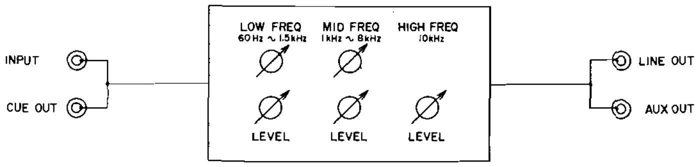


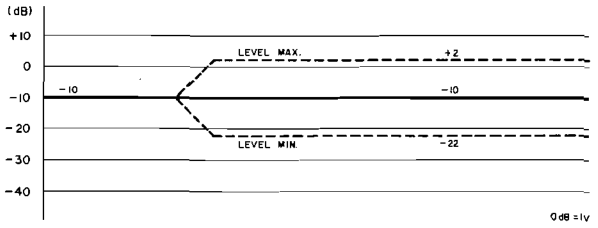
MU-20


VU METER
INPUT
PEAK



PE-20


INPUT
CUE OUT
LOW FREQ
60Hz ~ 1.5kHz
MID FREQ
1kHz ~ 8kHz
HIGH FREQ
10kHz
LEVEL
LEVEL
LEVEL
LINE OUT
AUX OUT

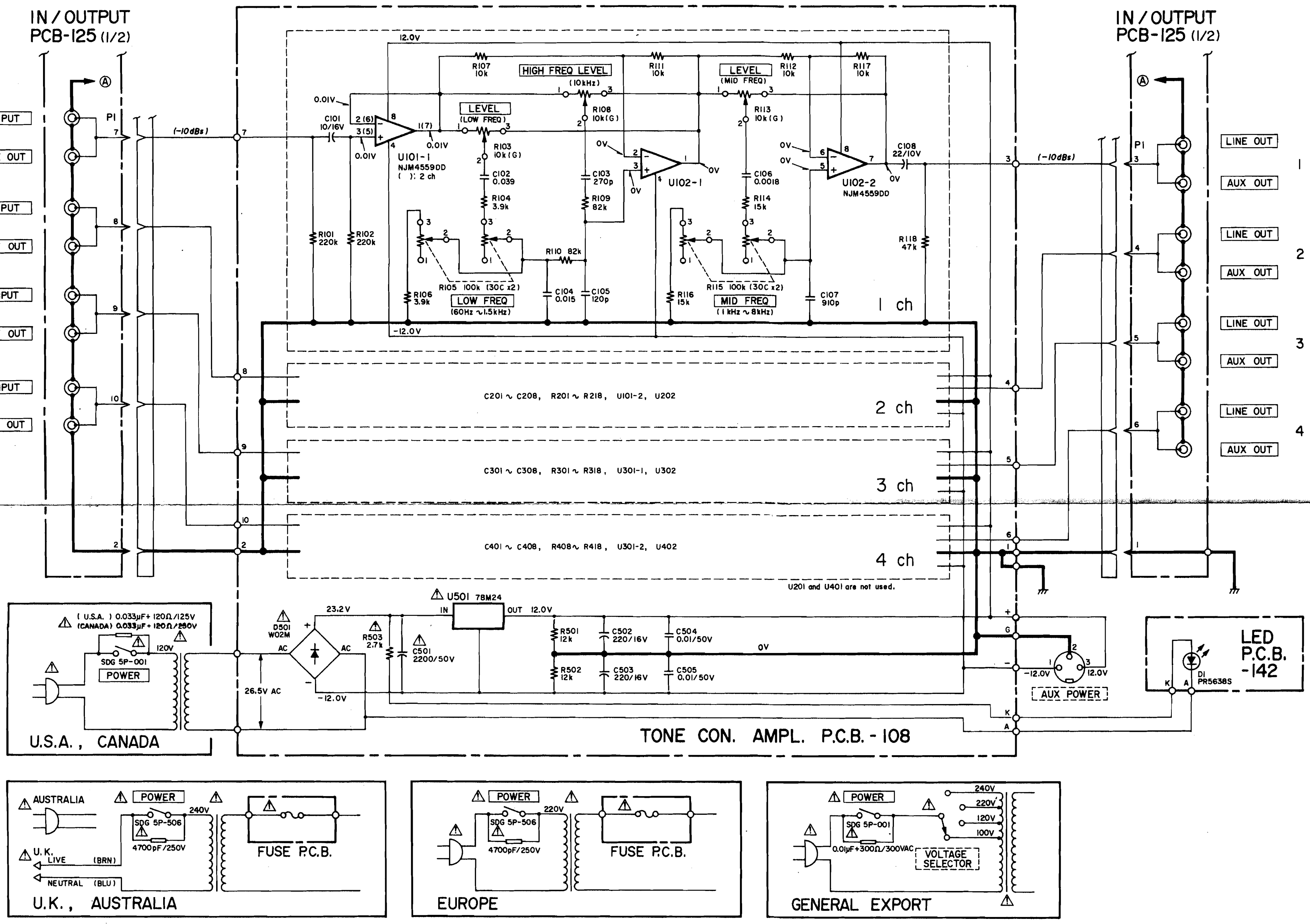


SYSTEM-20 AUDIO MIXER

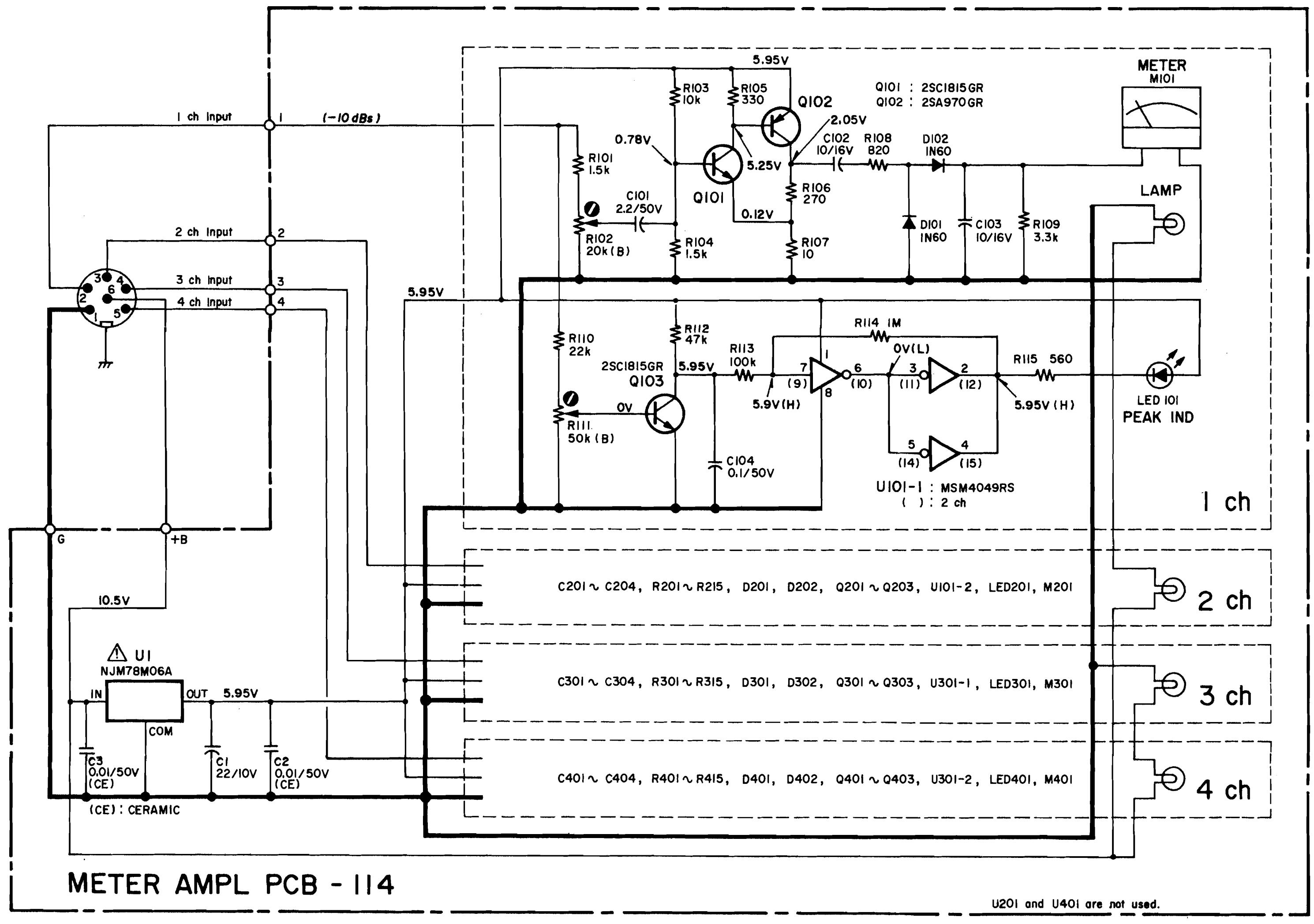
TASCAM
TEAC Production Products

TEAC CORPORATION	3-7-3 NAKA-CHO MUSASHINO TOKYO PHONE (0422) 53-1111
TEAC CORPORATION OF AMERICA	7733 TELEGRAPH ROAD MONTEBELLO CALIFORNIA 90640 PHONE (213) 726-0303
TEAC AUSTRALIA PTY., LTD.	115 WHITEMAN STREET SOUTH MELBOURNE VICTORIA 3205 PHONE 699-6000

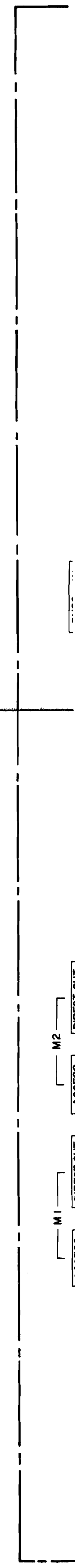
PRINTED IN JAPAN 0681U1.35·D-3733A


IN / OUTPUT PCB-125 (1/2)
INPUT
CUE OUT
1
2
3
4
P1
(-10dBs)
12.0V
0.01V
R107 10k
HIGH FREQ LEVEL (10kHz)
R111 10k
LEVEL (MID FREQ)
R112 10k
R117 10k
LEVEL (LOW FREQ)
R108 10k(G)
R113 10k(G)
C101 10/16V
U101-1 NJM4559DD ( ): 2 ch
R103 10k(G)
C102 0.039
R104 3.9k
C103 270p
R109 82k
U102-1
C106 0.0018
R114 15k
U102-2 NJM4559DD
C108 22/10V
R101 220k
R102 220k
R110 82k
R118 47k
R106 3.9k
R105 100k (30C x2)
LOW FREQ (60Hz ~ 1.5kHz)
C104 0.015
C105 120p
R116 15k
R115 100k (30C x2)
MID FREQ (1kHz ~ 8kHz)
C107 910p
1 ch
-12.0V
C201 ~ C208, R201 ~ R218, U101-2, U202
2 ch
C301 ~ C308, R301 ~ R318, U301-1, U302
3 ch
C401 ~ C408, R408 ~ R418, U301-2, U402
4 ch
U201 and U401 are not used.
IN / OUTPUT PCB-125 (1/2)
LINE OUT
AUX OUT
(U.S.A.) 0.033μF+120Ω/125V
(CANADA) 0.033μF+120Ω/250V
SDG 5P-001
POWER
120V
D501 W02M
23.2V
U501 78M24
IN OUT 12.0V
R503 2.7k
C501 2200/50V
R501 12k
C502 220/16V
C504 0.01/50V
R502 12k
C503 220/16V
C505 0.01/50V
0V
26.5V AC
-12.0V
AUX POWER
LED P.C.B. -142
D1 PR5638S
K A
U.S.A., CANADA
TONE CON. AMPL. P.C.B. - 108
AUSTRALIA
U.K.
LIVE (BRN)
NEUTRAL (BLU)
SDG 5P-506
4700pF/250V
240V
FUSE P.C.B.
U.K., AUSTRALIA
220V
EUROPE
0.01μF+300Ω/300VAC
100V 120V 220V 240V
VOLTAGE SELECTOR
GENERAL EXPORT

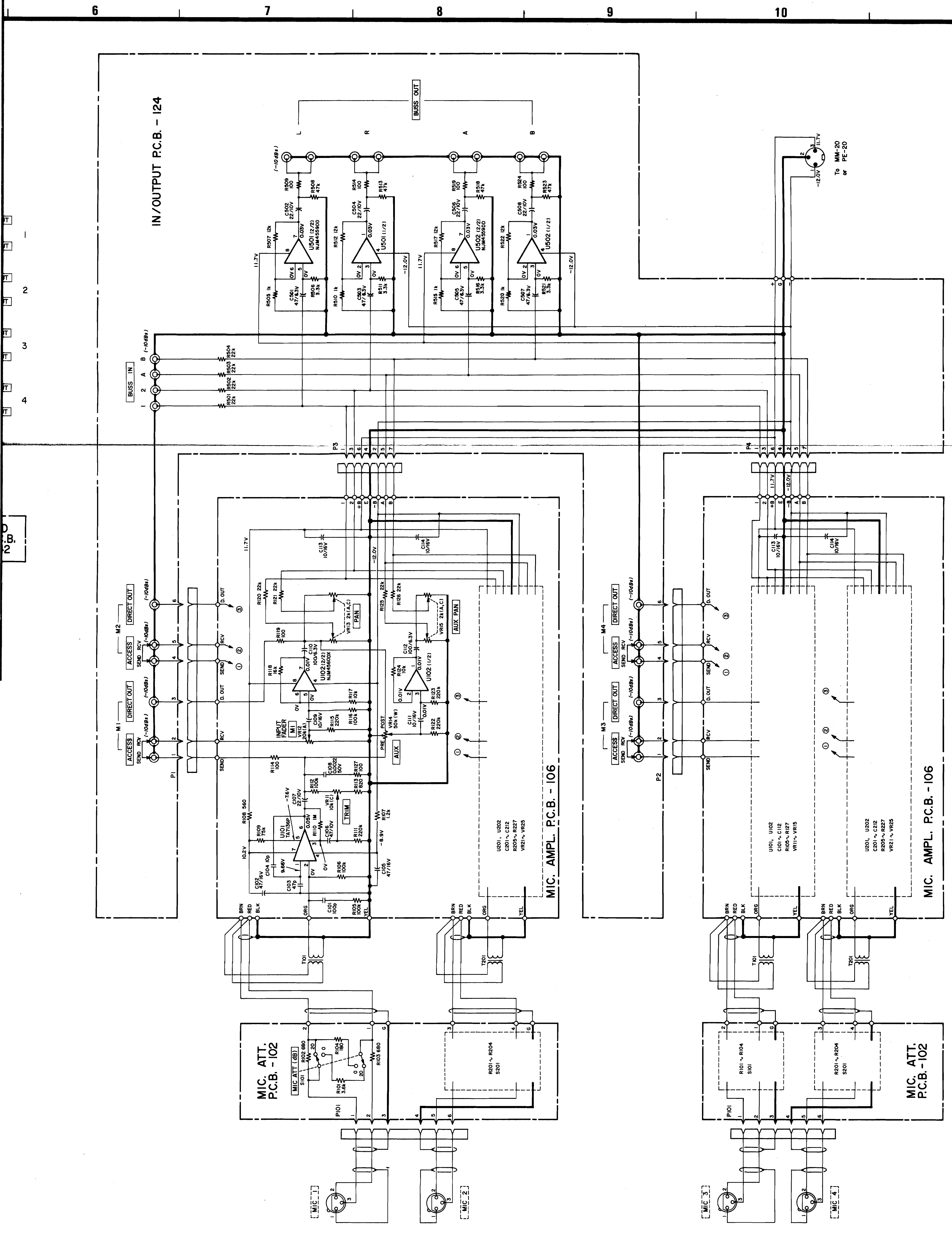
PE-20


1 ch Input
(-10dBs)
2 ch Input
3 ch Input
4 ch Input
5.95V
R103 10k
R105 330
Q102
Q101 : 2SC1815GR
Q102 : 2SA970GR
METER M101
0.78V
R101 1.5k
Q101
5.25V
2.05V
C102 10/16V
R108 820
D102 1N60
C101 2.2/50V
R102 20k(B)
R104 1.5k
0.12V
R106 270
R107 10
D101 1N60
C103 10/16V
R109 3.3k
LAMP
R110 22k
R112 47k
2SC1815GR Q103
R113 100k
R114 1M
0V(L)
R115 560
5.9V(H)
5.95V(H)
LED 101 PEAK IND
R111 50k(B)
C104 0.1/50V
U101-1 : MSM4049RS ( ) : 2 ch
1 ch
G +B
10.5V
C201 ~ C204, R201 ~ R215, D201, D202, Q201 ~ Q203, U101-2, LED201, M201
2 ch
U1 NJM78M06A
IN OUT 5.95V COM
C301 ~ C304, R301 ~ R315, D301, D302, Q301 ~ Q303, U301-1, LED301, M301
3 ch
C3 0.01/50V (CE)
C1 22/10V
C2 0.01/50V (CE)
(CE) : CERAMIC
C401 ~ C404, R401 ~ R415, D401, D402, Q401 ~ Q403, U301-2, LED401, M401
4 ch
METER AMPL PCB - 114
U201 and U401 are not used.

MU-20



NOTES
1. All
Res
2. All
3. The
mea
(Vo
sum
4. 0 dI


6
7
8
9
10
IN/OUTPUT P.C.B. - 124
BUSS OUT
L
R
A
B
BUSS IN
1
2
A
B
(-10dBs)
To MM-20 or PE-20
11.7V
-12.0V
U501 (2/2) NJM4559D
U501 (1/2)
U502 (2/2) NJM4559D
U502 (1/2)
P3
P4
M1
M2
M3
M4
DIRECT OUT
ACCESS
SEND
RCV
D. OUT
P1
P2
U102 (2/2) NJM4560DX
U102 (1/2)
U101 TA7136P
PAN
AUX PAN
INPUT FADER
M1
AUX
PRE
POST
TRIM
MIC. AMPL. P.C.B. - 106
U201, U202
C201 ~ C212
R205 ~ R227
VR21 ~ VR25
U101, U102
C101 ~ C112
R105 ~ R127
VR11 ~ VR15
BRN
RED
BLK
ORG
YEL
T101
T201
MIC. ATT. P.C.B. - 102
MIC ATT (dB)
S101
R101 ~ R104
S101
R201 ~ R204
S201
P101
MIC 1
MIC 2
MIC 3
MIC 4

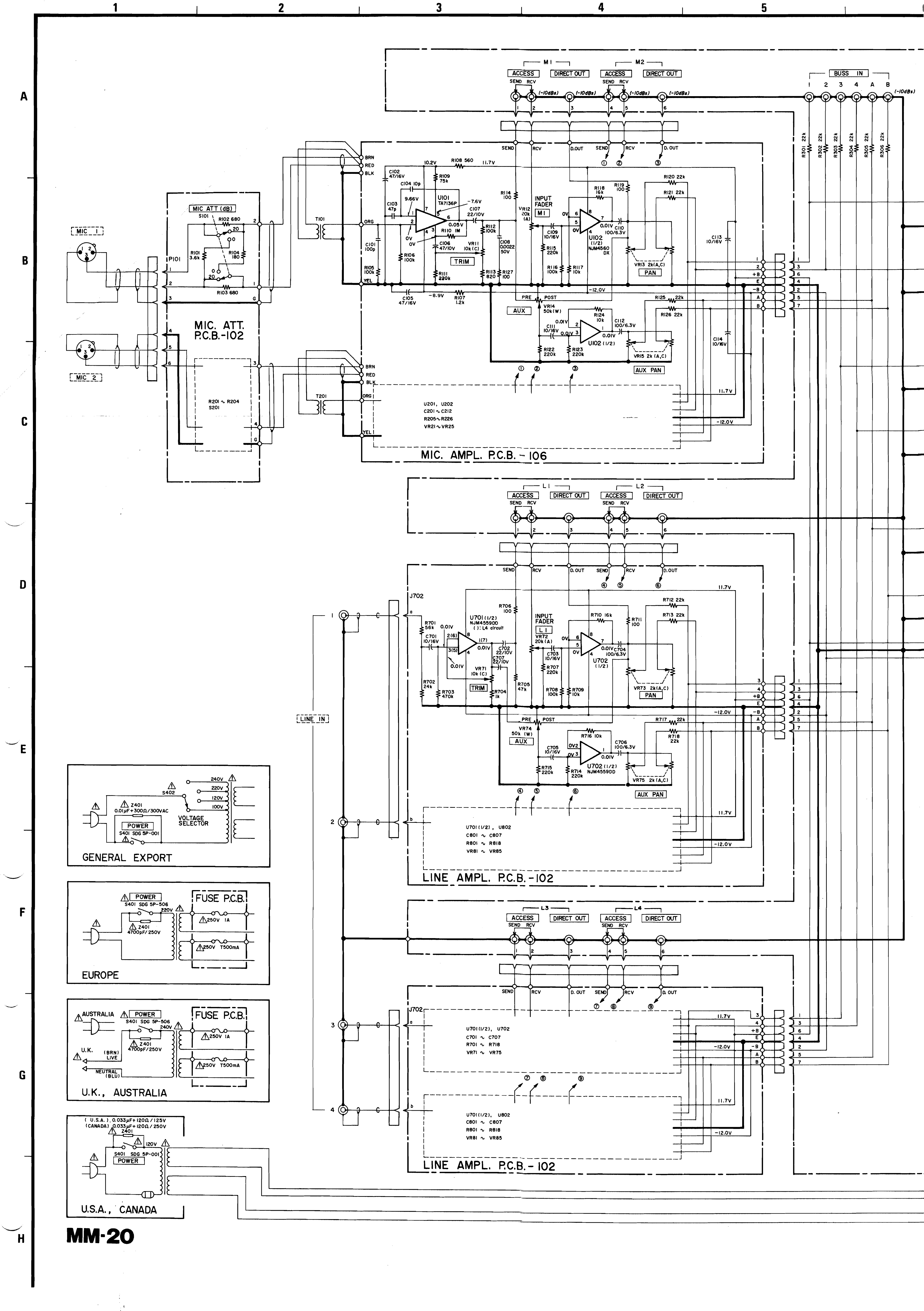
EX-20

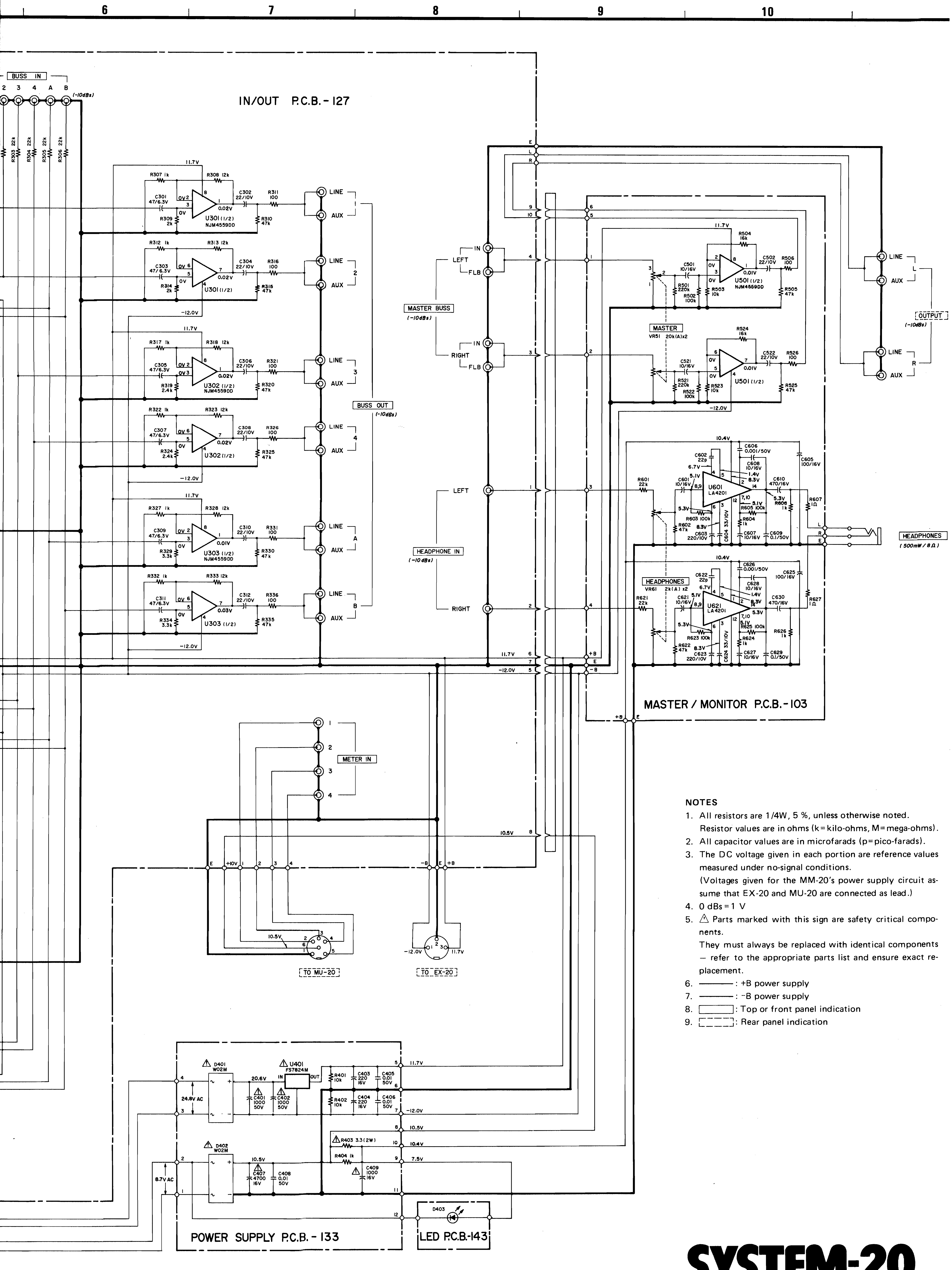
NOTES

1. All resistors are 1/4W, 5 %, unless otherwise noted.
   Resistor values are in ohms (k=kilo-ohms, M=mega-ohms).
2. All capacitor values are in microfarads (p=pico-farads).
3. The DC voltage given in each portion are reference values measured under no-signal conditions.
   (Voltages given for the MM-20's power supply circuit assume that EX-20 and MU-20 are connected as lead.)
4. 0 dBs = 1 V
5. ⚠ Parts marked with this sign are safety critical components.
   They must always be replaced with identical components — refer to the appropriate parts list and ensure exact replacement.
6. ———: +B power supply
7. ———: −B power supply
8. ☐: Top or front panel indication
9. [ ]: Rear panel indication

SYSTEM-20

AUDIO MIXER


1
2
3
4
5
A
B
C
D
E
F
G
H
M1
M2
ACCESS
DIRECT OUT
SEND RCV
(-10dBs)
BUSS IN
1 2 3 4 A B
R301 22k
R302 22k
R303 22k
R304 22k
R305 22k
R306 22k
MIC 1
MIC 2
MIC ATT (dB)
S101
R102 680
R101 3.6k
R104 180
R103 680
P101
MIC. ATT. P.C.B.-102
R201 ~ R204
S201
T101
T201
BRN
RED
BLK
ORG
YEL
C102 47/16V
C104 10p
C103 47p
C101 100p
R105 100k
R106 100k
R109 75k
R108 560
U101 TA7136P
R110 1M
C106 47/10V
C107 22/10V
VR11 10k (C)
TRIM
R111 220k
R112 100k
C108 0.0022 50V
R113 820
R127 100
C105 47/16V
R107 1.2k
R114 100
INPUT FADER
M1
VR12 20k (A)
C109 10/16V
R115 220k
R116 100k
R117 10k
R118 16k
R119 100
U102 (1/2) NJM4560 DX
C110 100/6.3V
R120 22k
R121 22k
VR13 2k(A,C)
PAN
C113 10/16V
PRE
POST
VR14 50k(W)
AUX
C111 10/16V
R124 10k
C112 100/6.3V
R125 22k
R126 22k
U102 (1/2)
R122 220k
R123 220k
VR15 2k (A,C)
AUX PAN
C114 10/16V
U201, U202
C201 ~ C212
R205 ~ R226
VR21 ~ VR25
11.7V
-12.0V
MIC. AMPL. P.C.B. - 106
L1
L2
J702
LINE IN
R701 56k
C701 10/16V
U701 (1/2) NJM4559DD
( ): L4 circuit
R702 24k
R703 470k
VR71 10k (C)
TRIM
R704 1k
C702 22/10V
C707 22/10V
R706 100
R705 47k
INPUT FADER
L1
VR72 20k (A)
C703 10/16V
R707 220k
R708 100k
R709 10k
R710 16k
R711 100
U702 (1/2)
C704 100/6.3V
R712 22k
R713 22k
VR73 2k(A,C)
PAN
VR74 50k (W)
AUX
C705 10/16V
R716 10k
C706 100/6.3V
R717 22k
R718 22k
R715 220k
R714 220k
U702 (1/2) NJM4559DD
VR75 2k (A,C)
AUX PAN
U701 (1/2), U802
C801 ~ C807
R801 ~ R818
VR81 ~ VR85
LINE AMPL. P.C.B. - 102
L3
L4
U701 (1/2), U702
C701 ~ C707
R701 ~ R718
VR71 ~ VR75
LINE AMPL. P.C.B. - 102
S402
240V
220V
120V
100V
Z401 0.01µF+300Ω/300VAC
VOLTAGE SELECTOR
POWER
S401 SDG 5P-001
GENERAL EXPORT
S401 SDG 5P-506
Z401 4700pF/250V
FUSE P.C.B.
250V 1A
250V T500mA
EUROPE
AUSTRALIA
U.K.
(BRN) LIVE
NEUTRAL (BLU)
U.K., AUSTRALIA
(U.S.A.) 0.033µF+120Ω/125V
(CANADA) 0.033µF+120Ω/250V
120V
U.S.A., CANADA
MM-20


6
7
8
9
10
BUSS IN
2 3 4 A B
(-10dBs)
IN/OUT P.C.B.-127
U301 (1/2) NJM4559DD
U302 (1/2) NJM4559DD
U303 (1/2) NJM4559DD
LINE
AUX
BUSS OUT
(-10dBs)
MASTER BUSS
(-10dBs)
LEFT
RIGHT
IN
FLB
HEADPHONE IN
(-10dBs)
MASTER
VR51 20k(A)x2
U501 (1/2) NJM4559DD
OUTPUT
(-10dBs)
L
R
U601 LA4201
U621 LA4201
HEADPHONES
VR61 2k(A) x2
HEADPHONES
(500mW/8Ω)
MASTER / MONITOR P.C.B.-103
METER IN
TO MU-20
TO EX-20
11.7V
-12.0V
10.5V
10.4V
7.5V
20.6V
24.8V AC
8.7V AC
D401 W02M
D402 W02M
U401 FS7824M
D403
POWER SUPPLY P.C.B.-133
LED P.C.B.-143

NOTES

1. All resistors are 1/4W, 5 %, unless otherwise noted.
   Resistor values are in ohms (k=kilo-ohms, M=mega-ohms).
2. All capacitor values are in microfarads (p=pico-farads).
3. The DC voltage given in each portion are reference values measured under no-signal conditions.
   (Voltages given for the MM-20's power supply circuit assume that EX-20 and MU-20 are connected as lead.)
4. 0 dBs = 1 V
5. ⚠ Parts marked with this sign are safety critical components.
   They must always be replaced with identical components – refer to the appropriate parts list and ensure exact replacement.
6. ———: +B power supply
7. ———: −B power supply
8. ▭: Top or front panel indication
9. ⬚: Rear panel indication

SYSTEM-20

AUDIO MIXER